Theses and Dissertations | 1. Thesis and Dissertation Collection, all items

1990-03

Introduction to Command, Control and Communications (C3) through comparative case analysis

Berg, Scott A.

Monterey, California. Naval Postgraduate School

http://hdl.handle.net/10945/37538

②

AD-A230 368

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

INTRODUCTION TO COMMAND, CONTROL AND COMMUNICATIONS
(C3) THROUGH COMPARATIVE CASE ANALYSIS

by

Scott Alan Berg

March 1990

Thesis Advisor: Dr. Carl R. Jones

Approved for public release; distribution is unlimited.

91 1 2 075

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS

2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION / AVAILABILITY OF REPORT
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	Approved for public release; distribution is unlimited.

4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)

6a. NAME OF PERFORMING ORGANIZATION Naval Postgraduate School	6b. OFFICE SYMBOL (If applicable) CC	7a. NAME OF MONITORING ORGANIZATION Naval Postgraduate School

6c. ADDRESS (City, State, and ZIP Code) Monterey, CA 93943-5000	7b. ADDRESS (City, State, and ZIP Code) Monterey, CA 93943-5000

8a. NAME OF FUNDING / SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS			
	PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
INTRODUCTION TO COMMAND, CONTROL AND COMMUNICATIONS (C3) THROUGH COMPARATIVE CASE ANALYSIS (UNCLASSIFIED)

12. PERSONAL AUTHOR(S)
Berg, Scott A.

13a. TYPE OF REPORT Master's Thesis	13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) March 1990	15. PAGE COUNT 128

16. SUPPLEMENTARY NOTATION
The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Command, Control and Communications, Interoperability, Command Structure, Crisis Action, Decision Making, Contingency Operations.

19. ABSTRACT (Continue on reverse if necessary and identify by block number)
This thesis contains material for the course, Introduction to Command, Control and Communications (C3). The first part of the thesis describes selected principles and concepts of C3 related to communication management, interoperability, command structure and standardization. The Crisis Action System is described emphasizing the roles and functions of the Joint Chiefs of Staff and the Office of the Secretary of Defense. A discussion of decision making in command and control examines the principles of unity of command, echelon skipping and span of control. Finally, the Joint Task Force (JTF) apparatus is reviewed from the perspective of interoperability. The second part of the thesis contains four case studies designed to provide an understanding of command and control by developing a competence to diagnose and solve command and control situations. The solutions to the cases require applying the principles and concepts presented in the first part. The four cases are: (1) the Iran hostage rescue attempt; (2) the invasion of Grenada; (3) the raid on Libya; and (4) the rescue of the S.S. Mayaguez.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL Dr. Carl R. Jones	22b. TELEPHONE (Include Area Code) (408) 646-2772 · 22c. OFFICE SYMBOL 39

DD Form 1473, JUN 86   Previous editions are obsolete.   SECURITY CLASSIFICATION OF THIS PAGE

Introduction to Command, Control and Communications (C3)
Through Comparative Case Analysis

by

Scott A. Berg
Lieutenant Commander, United States Navy
B.A., University of Washington

Submitted in partial fulfillment
of the requirements for the degree of

MASTER OF SCIENCE IN SYSTEMS TECHNOLOGY

from the

NAVAL POSTGRADUATE SCHOOL
MARCH 1990

Author: _____
Scott A. Berg

Approved by: _____
Carl R. Jones, Thesis Advisor

_____
Allan W. Tulloch, CDR, USN, Second Reader

_____
Carl R. Jones, Chairman
Joint Command, Control and Communications Academic Group

ABSTRACT

This thesis contains material for the course, Introduction to Command, Control and Communications (C3). The first part of the thesis describes selected principles and concepts of C3 related to communication management, interoperability, command structure and standardization. The Crisis Action System is described emphasizing the roles and functions of the Joint Chiefs of Staff and the Office of the Secretary of Defense. A discussion of decision making in command and control examines the principles of unity of command, echelon skipping and span of control. Finally, the Joint Task Force (JTF) apparatus is reviewed from the perspective of interoperability.

The second part of the thesis contains four case studies designed to provide an understanding of command and control by developing a competence to diagnose and solve command and control situations. The solutions to the cases require applying the principles and concepts presented in the first part. The four cases are: (1) the Iran hostage rescue attempt; (2) the invasion of Grenada; (3) the raid on Libya; and (4) the rescue of the S.S. Mayaguez.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

The author wishes to acknowledge the dedication and patience of his wife Cathy, without whose energy and motivating encouragement this thesis would not have been possible. In addition, the author wishes to express his appreciation to Lieutenant Joel Swanson, USN, for his tremendous support throughout this entire experience.

I. INTRODUCTION

The concept of command and control (C2) is a constantly evolving and vital process in today's military organizations. In principle, the development of C3 systems in the U.S. can be viewed as a function of the interaction of several factors: (1) the availability of technological capabilities; (2) changes in the geo-political environment and the political role of the U.S. military force in international affairs; (3) military requirements as determined by U.S. strategic doctrine, the perceived threat to national security, and the operational requirements of different weapons systems and; (4) the evolution of a political-strategic doctrine that was predicated on providing the commander in chief with the means to manage and control levels of military conflict and escalation ranging from crisis management through conventional war and nuclear strategic warfare.

The fundamental task of C2 systems remains constant. It is to serve the process of making, disseminating, and implementing informed command decisions in order to obtain optimum effectiveness of the nation's military forces and resources in peacetime, crisis, hostile actions, and war. Command and control system success then can be measured by the way it supports this process reliably and effectively - at every level and in all circumstances.

The "vital" aspect of the C2 process can best be appreciated by reviewing some of the penalties associated with its failure. In the author's opinion, C2 specialists have a mindset (although pragmatic in approach) which tends to focus on what is and what might be rather than on what has been. Over the past decade, four separate and distinct significant military actions have been conducted by the United States: the Iran hostage rescue attempt, the Libya raid, the Grenada invasion and the S.S. Mayaguez rescue. In each operation, detailed post-action analysis was conducted to describe "lessons-learned." Different command, control, and communications (C3) structures were used in each case. One of the principal questions that was explored by these studies in each of these operations was whether or not the U.S. military establishment learned from them. Analysts and military

1

experts claim that the same lessons continue to occur in each operation because the military does not do an adequate job of institutionalizing or transferring the experiences of one operation to subsequent operations.

A. PURPOSE

In view of today's weapons of mass destruction, general warfare as it was waged in World War I and World War II has significantly changed. General warfare as seen in those times has altered. Since then, the U.S. has faced limited warfare and low-intensity conflict. Insurgency, terrorism, revolution and civil war now dominate today's military operations.

The purpose of this thesis is to enhance an understanding of command and control, and to develop competence in diagnosing and solving command, control and communications situations. For the purposes of this paper, the term "command" will be used to denote the function to be performed, the term C3 will stand for the supporting system, while the term C2 will mean the process that commanders follow (in planning, directing, coordinating, and controlling) as they utilize C3 systems to carry out the function of command.

This thesis will illustrate the objectives taught in the course -- Introduction to C3 -- through comparative case studies which are focused on recent real-world military contingency operations. The primary area of focus will be to illustrate C3 in a present day context. It will provide an introduction to the role of communication in the C3 process. Command and control planning in crisis response will be the backdrop for identifying military and civilian deficiencies in the military operations examined. The overall C2 process will be examined primarily from the perspective of decision making, where the commander, the decision maker, is at a distance from both the phenomena on which he bases his decisions and from the people who execute them.

A commander at any echelon worries about many things, but the three significant ones are:

- whether he will be informed of significant events that affect his operation,

- whether he will be able to transform the information he receives into sensible and timely decisions,

- whether his decisions will be executed in time to affect the out come of the operation. (Van Creveld, 1985, pg. 17)

Hence, this paper will provide a vehicle for deciding how things happened, how these things should have happened, what C3 structure was in place to respond (and provide support) to the crisis and what C3 structural changes could (or should) have been made.

B. BACKGROUND

U.S. history, from its very beginning, reflects a desire to limit centralized (governmental) control and depend on locally elected leaders to exercise control for the overall good of the people. Separation of powers in federal government -- executive, judicial, and legislative branches -- has been continually stressed as an important fundamental principle. As a developing nation with widely divergent interests, the U.S. has brought forth separate and diverse economic and political power bases. A political culture developed which emphasized the advantages of diversity, local initiative, and self-reliance. Authority was often delegated to (or assumed by) those who would execute required tasks. Even today in business and industry, authority is relegated to lower (or lowest) levels of management. The trend in military matters may seem to refute this style, but the preferred approach emphasizes a style of management without rigid control mechanisms (Gissin, 1979, pp. 48-69).

The U.S.'s approach to military forces reflects the constitution and a governmental tradition that regulates the organization of military services and the national command arrangement. Although the president is commander in chief of our military forces, it is Congress that is given the constitutional authority to raise and support armies, to provide and maintain a navy, and to make rules for the regulation of the land and naval forces. Over the years, Congress has opposed any effort to create a general staff and has generally encouraged a degree of decentralization within each service as well. Historically, and in recent times, U.S. military leaders have espoused the concept of granting substantial autonomy to lower echelon commanders. Furthermore, congressional mandates have led the military to acquire the practice of deferring to civilian institutions, private and public. The result is a military organization which has significant variety, emphasizes decentralization and dispersal of effective influence, and takes for granted that effective action to achieve a goal requires the consent of many others (e.g., military commanders must often negotiate to make efficient use of assets that belong to other services). Even in the area of strategic nuclear forces (SNF), where the U.S. has developed a system of detailed pre-planning and tight control over weapons use, the processes of policy planning and procurement are decentralized and negotiated.

The historical and political implications touched on thus far constitute an extremely complex subject that is not all that well understood but has had a major impact on the evolution of C3 systems. The broad background factors briefly presented here are reflected in C3 systems by management techniques, organizational structure, information flow processes, relationships between command

echelons, and interpersonal relationships within commands. In assessing U.S. C3 systems, it is helpful to consider:

- factors affecting C3 development;
- the concept of a decentralized power structure;
- the concept of no dominant service;
- qualities such as initiative and innovation;
- and the influence of a loose and unstructured control mechanism.

It is evident that the importance of C3 will continue to increase in the future. While C3 has always played a critical role in all warfare areas and during transition between levels of conflict, the speed of information flow and the range, mobility and destructiveness of modern weapons have added a new dimension to C3 requirements. (Boyes, Andriole, 1987, pp. xi-xiv)

C.   CASE ANALYSIS METHODOLOGY

The purpose of using a comparative case methodology is to develop competence in diagnosing organizational and institutional situations, specifically from a C3 perspective. There are numerous philosophies with regard to the case method. Essentially, the case is a vehicle by which a chunk of reality is brought into a class to be analyzed and understood. They are catalysts for enhancing the process of learning from experience. Case study allows the student to apply concepts, theories, and techniques to an actual incident within the military organization. (Dooley, Skinner, 1977, pp. 277-289)

The case method originated at the Harvard Business School as a link between the classroom and the real world. The cases presented in this thesis are real and reflect the writings of people who were actually involved in the operations. Although many of the "lessons-learned" in these conflicts have been institutionalized, many still remain "unsolved." The guidelines here are designed to help the student make the most out of the case method (Dooley, Skinner, 1977, pp. 277-289):

1. Read the corresponding material in the textbooks of the course. This establishes a theoretical framework for analysis.

2. Read the case. Note the important points of the case.

3. Reread the case.

4. Analyze the case using the following model:

   A. Problem identification

      1. Define the major problem(s)

         a. Use the organizational terms and concepts of the course work.

         b. Not all information presented in the case may be relevant.

         c. If not all the information is available, be prepared to make some assumptions.

      2. Define the secondary problem(s)

         a. Use the same standards as for the major problem.

         b. Understand why they are secondary problems.

   B. Analyze the situation

      1. State the most reasonable cause(s) of the problems identified.

      2. State the relevant concepts, definitions, theories, structures to the problem(s).

3. State insights that are present.

C. Solutions

    1. Consider possible solutions to the problems.

        a. Generate as many solutions as feasible.

        b. Look at probable effects of each solution--consider pros and cons of each.

    2. Choose "best" solution.

    3. Describe implementation procedures.

        a. Explain what changes have to be made to the organization.

        b. Define the risks.

        c. Are there other aspects of the problem not addressed in the solution?

D. Strategies for the future

    1. What long-range strategies could the organization adopt to prevent similar problems in the future?

    2. What other strategies would be adopted to prevent similar problems experienced in other services?

In summary, case analysis should identify:

1. the system involved - primary components relevant to the situation under study. Who are the principal players, what is their role, etc.?

2. the goals of the system components - each system or component of the system has implied or explicit goals.

3. the behaviors, mechanisms, structures and strategies of the system components. (Dooley, Skinner, 1977, pp. 277-289)

D. ORGANIZATION AND SCOPE

The principal objective of this paper is to examine and determine from a comparative perspective the organizational and institutional consequences that (1) communications management; (2) interoperability; (3) command structure; and (4) standardization (e.g., rules of engagement) may have on the command and control of military forces in conflict.

The primary causes for the failure or success of an operational C3 system during combat are found in the organizational coherence and the institutional flexibility achieved through the C3 doctrine and practices (Gissin, 1979, pp. 5-8) The effects and consequences of technological military innovations can best be understood by studying the practices of C3 during combat or crisis operations. The environment of combat provides the best test for the operational chain of command and the organizational flexibility in executing a C3 doctrine.

This thesis will review the C3 doctrine and practices of the U.S. services in conflicts dating back to the attack on the S.S. Mayaguez up to the present day invasion of Grenada. No attempt is made to provide a detailed historical (or chronological) account of specific battles or combat engagements. Rather, the focus is on the principal problems of C3 encountered in each case and their consequences for the U.S. military organization as a whole.

Due to the comparative nature of this thesis and its length, it is divided into two parts. Part One deals with several important aspects of C3 doctrine. Chapter 2 will provide an overview with definitions of the concepts of communications management, interoperability, command structure and standardization. Coalition

warfare is part of the U.S.'s overall strategy, and examining different service doctrines is essential to solving the complex problem of interoperability. Chapter 3 will provide a discussion of the Crisis Action System. It will also provide a brief description of the roles and functions of the Joint Chiefs of Staff (JCS) and the Office of the Secretary of Defense (OSD) in crisis management. Chapter 4 looks at C2 in decision making and addresses the important concept of the structure of the operational chain of command in decision making. Chapter 5 will discuss the joint arena in today's military forces and describe how the Joint Task Force (JTF) apparatus is organized.

Part Two of this paper then is a series of comparative case studies to be used in a classroom environment to illustrate the four principle aspects of C3 doctrine described above. Chapter 6 will look at the Iranian Hostage Rescue Attempt to examine and analyze what role unity of command, operational planning, communications management, and decision making played in the failures and successes experienced with the operation. Chapter 7 will examine the principles of interoperability through a case study on the Grenada Invasion. Chapter 8 will analyze the principles of command structure and standardization of C3 doctrine through a case study on the raid on Libya. Chapter 9 will review the recapture of the S.S. Mayaguez from the perspective of centralization of decision making in a crisis with emphasis on command structure and operational planning.

II. COMMAND AND CONTROL IN CONFLICT OVERVIEW AND DEFINITION

As in the case with the human central nervous system (CNS), a military C3 system can function well under routine conditions in peacetime, but fail when damaged or under stress. In many ways, the C3 system accomplishes for a military organization the functions that the CNS, including sensory organs, accomplishes for a human. The human's eyes, ears, and other sensors gather information and flash signals to the brain via a complex network of information channels. The brain, while continuing to regulate routine functions, synthesizes these inputs with stored data, filters out extraneous signals, makes decisions, and communicates messages that control the activities of the legs, arms, etc. The military C3 system employs intelligence sensors, communication links, stored data, information filters and processors, and control procedures in pursuit of organizational goals. This metaphoric description points out that there are a number of definitions, each denoting different aspects of the C3 system.

The U.S. definition of C3 is comprehensive, but in practice, the supporting subfunctions (e.g., communications, intelligence, automated procedures, electronic warfare, etc.) are often treated as separate elements rather than as parts of an overall concept. Studies and analysis of the subfunctions are numerous and varied, but a comprehensive examination of the whole is lacking. The U.S. lacks a commonly accepted frame of reference within which to address C3 issues. C3 program elements sometimes face difficulty in surviving budget cuts because it is

difficult to relate them in an organizational fashion to positive military worth. (Gissin, 1979, pp. 43-79)

The U.S. has extensive resources available for crisis management in support of national interests. In distant areas, the U.S. can usually establish a superior ad hoc C3 capability. Superior technology provides advantages in capacity, throughput and size. U.S. space-based systems are characterized as reliable and technologically superior to those of the Soviet Union. Satellite communication systems provide worldwide coverage. Our worldwide base structure, plus greater access to friendly facilities and wide ranging naval operations, provide the capability to quickly apply intelligence and reconnaissance assets to crises areas. The same resources provide high-capacity communications channels to the National Command Authority (NCA).

A. COMMUNICATION MANAGEMENT - ITS ROLE IN C2

C3 is a field in which technology continues to change rapidly. Space, airborne, ground-based and underwater sensors provide large amounts of information to and from widespread areas of the world. High capacity communication systems transmit information over great distances almost instantaneously. Computers and information management techniques allow rapid processing and display of large amounts of information. Finally, commanders have at their disposal long-range, accurate and highly destructive weapons. Trends indicate that rapid advancement in C3 technology will continue.

The U.S. military is dependent more than ever on in-place, expensive C3 hardware which is difficult and costly to change. But change is not just limited by

cost. As it is defined, C3 inherently is related to the management structure of military organizations and reflects their fundamental organizational characteristic way of doing business. Because it is so fundamental, C3 systems are less easily changed than weaponry. (Gissin, 1977, pp. 195-211)

In general, C3 technology is often defined in terms of hardware facilities and associated software. These include voice and digital radio communication systems, command centers (fixed and mobile), radar systems, surveillance and intelligence early warning systems (indications and warning systems or I&W refers to ground, sea and airborne or spaceborne systems), data collection, and processing systems (computers, electronic display consoles, manual displays, etc.) (Gissin, 1977, pg. 18). It is easy to distinguish between technological systems that are designed to collect (I&W and surveillance), process (computers), and disseminate (communications) information. Each of these sub-systems as part of the whole C3 system permit a commander (at various echelons) to communicate with and perform the functions of C2 with his forces and weapons systems. In the last 10-15 years, rapid advancements in micro-electronics have made significant contributions toward the development of integrated C3 system hardware. Reliability, availability and maintainability improvements have also had a significant impact on making systems more compact and efficient (Gissin, 1977, pg. 19). Senior commanders at higher echelons can now communicate directly in a secure mode with action elements, receive reports and processed information, and transmit orders in near-real-time. In an information rich environment, the role that communications plays in the C2 process is more important now than ever before. The problems faced by our

military commanders is one where it is assumed that the procedures, personnel, organizational arrangements and supporting technology are compatible and mutually support each other. (Gissin, 1977, pg. 75)

For any given C3 structure, it is necessary to identify and systematize generic communications functions. The communication process can be defined as consisting of certain generic functions that are inherent to any C2 system at varying levels of activity. This process consists of the following functions (Gissin, 1977, pp. 75-76):

1. gather information from various sources by electronic as well as human means (the intelligence collection function);

2. organize, synthesize and process the information (data compilation, translation of electronic signals to intelligence data, decoding, distribution to different intelligence organizations for interpretation and evaluation);

3. evaluate the content of the processed information;

4. transmit orders and directions to operational units on the basis of that information;

5. monitor the mission in progress and maintain communication with operational forces;

6. receive timely feedback information from field units and distribute relevant information and directions to appropriate echelons in a timely fashion adjusting for the changing conditions and battlefield picture conveyed by the feedback process.

It is important to note here that this list of generic functions exists at all levels of command regardless of the level of conflict, branch of military service, and weapon system employed (ground, air, naval). Just as there may be two different combat units or two different warfare elements of the same combat unit, there will be differences in these functions. For example, the relative priority given to each

13

function in a combat situation, an assigned weapon system's ability to respond to mission requirements, and the time available for information exchange are just a few of the differences that may exist. The element of time becomes much more constrained in a tactical air engagement than in an infantry or artillery engagement.

It is useful here to relate the relationship between doctrine and process. One way to do this is by examining and analyzing the decision time cycle. The decision time cycle for any given command structure is defined as:

> the total amount of time it takes to execute the six generic functions of the control and communications processes for a given force within a given level of conflict and operational combat environment. (Gissin, 1977, pg 78)

Another way to look at it is by analyzing the time span involved in initiating a decision, through its transmission (by some medium), execution by operational forces, and reception of feedback (this is essential for allowing change or modification to plans). At the strategic political level, the decision making process is more complex than that at an operational-tactical level. The political-military machinery includes separate organizations and structures, different perceived threats and institutional and other relationships between the military and civilian hierarchies. In addition, level and magnitude of C3 facilities impact the time decision cycle. (Gissin, 1977, pg. 79)

At the operational-tactical level, the way a C3 doctrine is practiced or executed will influence the decision time cycle of communications. In the context of two opposing forces having equal C3 technology and capability, the important variables that impact the decision time cycle are as follows (Gissin, 1977, pg. 80-82):

- the institutional and organizational barriers that impede the communications process; these may include a multi-level echelon command structure where information follows the regular chain of command;

- flexibility of the C3 doctrine; does it incorporate, for example, flexible decision guidelines and decision thresholds for operational units?

- type and style of planning military operations; pre-formatted, centralized and detailed planning, for example, may limit the capacity for flexible response, thus lengthening the decision time cycle.

As with the U.S. Navy's Composite Warfare Commander (CWC) doctrine, which stresses the principle of "command by negation" to lower operational units, flexible planning accelerates the decision time cycle and permits a quicker reaction time. This doctrine serves to enhance command of lower echelons, but the down side is that those at the top echelons will have less specific control. In summary, it is important to understand that the C3 doctrine is affected by a number of constraints which determine the decision time cycle of the communication process. (Gissin, 1977, pg. 79)

B. INTEROPERABILITY - JOINT C3

Two definitions of interoperability are used by the Department of Defense:

Interoperability - 1. The ability of systems, units or forces to provide services to and accept services from other systems, units or forces and to use the services so exchanged to enable them to operate effectively together. 2. The condition achieved among communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users. The degree of interoperability should be defined when referring to specific cases. (Boyes, Andriole, 1987, pg. 383)

As evidenced by events over the last decade, U.S. military forces must be capable of performing single service operations, joint service operations, and

combined operations with allied nations. For the purposes of this paper, C3 interoperable systems are: those C3 personnel and equipments (including software) which are used in joint/combined operations and, based on established requirements (doctrine and/or standard operating procedures), are required to transfer information among different U.S. services/allied forces. (Naval Research Advisory Committee, 1987, pg.4)

Most military planners and strategists agree that it is unlikely that many operations would be conducted by a single service. In fact, in the most recent contingency operations, conscious decisions were made at the highest levels to give all services a part of the action. The invasion of Panama may be one exception, but the results are still under review (in fact, preliminary comments indicate that Panama was successful because it was a single service venture). The U.S. military has been challenged throughout history to operate effectively with each other and its allies. Interoperability among U.S. services has never been needed more than right now. It won't be until interoperability is achieved through examining doctrine, planning, procedures, hardware and operational techniques among our own services, that we can then begin to understand and analyze the complex problem of interoperability with our allies. Needless to say, these interoperability issues must be addressed simultaneously.

The success of joint and combined operations relies largely on the ability of C3 systems of the joined forces to interoperate effectively. Interoperability does not stand alone. It reflects the dynamic integration of planning, training, doctrine, procedures, force structure, experience and hardware. Identifying major

interoperability requirements for deployed forces and their C3 systems requires an examination of the experiences of actual contingency operation. In addition, exercises, simulations and combat (analytical) modeling systems can be used to help identify requirements. The bottom line in interoperability decisions is to determine how much interoperability is required and what resources should be allocated to achieve the requisite degree of interoperability.

Service doctrine to accomplish a given operational task (or mission) has a significant impact on the interoperability requirements for C3 equipment and procedures. Differences among services in their doctrinal approach has been studied, examined and modified specifically in the employment of air assets (Naval Research Advisory Committee, 1987, pg. 8). The selection of a C3 system and the requirements for these systems must include a detailed review of the doctrine which each service uses. Required operational capabilities (ROCs) are one procedure used for establishing requirements. These are extended processes for establishing requirements taking on the average one to two years form submission to implementation. (Naval Research Advisory Committee, 1987, pg. 9)

Interoperability is commonly labeled as a hardware problem because most interoperability problems are first realized in the failure of C3 equipment to transfer information. Differing doctrines, procedures and/or operator training also contribute to lack of interoperability. Interoperability is basically an operational rather than a design problem. Design certainly affects interoperability, but interoperability is needed only under operational conditions. Lack of interoperability becomes noticeable when the military attempts to carry out an operational task.

Interoperability is much more than just a hardware problem. In addition to hardware, military tactics, operating procedures, software language formats, and personnel training must also be considered. This defines a management problem: requirements must be established, standards which ensure meeting those requirements must be specified and audited to assure compliance and total system testing using hardware and software. Operators or users must also be involved by testing the system in a real world scenario to validate interoperability performance (Naval Research Advisory Committee, 1987, pg. ii). Commanders in chief (CINCs), on whose shoulders this business of interoperability ultimately rests, must fight with what they currently have and make the existing equipment and systems work. The current emphasis appears to be on procuring new systems to solve interoperability problems. In a quick response scenario, the only capability that counts is that which gets in the hands of the users. The only interoperability that counts is the interoperability that those same users have at hand at the time or in the near future (Naval Research Advisory Committee, 1987, pg. ii).

Interoperability of both national and international forces is constantly changing relationships. The most current example of this is the changing face of the NATO and Warsaw Pact. It is obvious to the most casual observer that interoperability problems will not be resolved all at once. There are several important items which must be considered when trying to understand the interoperability problem (Boyes, Andriole, 1987, pp. 382-388):

1. The Joint Tactical C3 Agency (JTC3A) was created by the DOD a few years ago to ensure interoperability of tactical C3 systems for joint or combined operations. Its charter is to develop and maintain joint architecture, interface

standards and interface definitions. This effort was conducted to create a management structure whose sole function is to address the interoperability problems at the tactical level.

2. Common equipment is one method that will reduce interoperability problems. Common language, common procedures and a common understanding of how each other operates also contributes to the amelioration of the interoperability problem.

3. Common standards are required to ensure interoperability. This will alleviate any problems that might occur when systems developed by different services or other nations must be integrated.

4. Operational forces must share a common doctrine and tactics. Although it is unlikely that this is achievable because of the world-wide nature of our military commitments, educating other services or our allies in each others' doctrines and procedures can provide huge dividends in the interoperability of forces. Developing a joint doctrine is underway in the U.S..

C. COMMAND STRUCTURE: THE CHAIN OF COMMAND

Every organization has a clearly defined hierarchy of echelons. A command structure can be typified by the number of intermediate echelons between the decision makers at the top echelon and the operational units near the bottom echelon. Delegation of authority or allocation of responsibility among these various levels of command are important characteristics of the command structure. Formal authority is normally vested at the top echelon and is passed down the chain of command. In addition, there is a clear distinction between the actual responsibilities relegated to staff positions and line positions.

Unlike civilian business organizations, military organizations and their inherent command structures have significantly different peacetime daily operations from those used in combat or wartime. In peacetime, daily routines are defined in clearly

distinct patterns for both administrative and operational chairs-of-command. In war, command structures undergo substantial modification in the delegation of authority and responsibility (Gissin, 1977, pg. 51). For example, an army division commander may have, during peacetime, complete control over the day-to-day operations and training of his brigades. This includes maintenance, logistics, administration and other responsibilities. When a contingency operation is underway, part of his division can be transferred to the theatre and come under the direct and complete control of the theater commander for combat operations and deployment of forces. This arrangement is standard in all of the services. The navy's east coast squadrons are under the administrative control of one commander (low numbered squadrons) but change operational control and procedures (CHOP) to a different squadron commander (high numbered) in the final stages of preparations for deployment. U.S. Tactical Air Command provides training, preparation and combat readiness of U.S. based tactical air squadrons and transfers them to theater commanders to meet operational commitments abroad or in response to crises.

An important distinction exists between civilian and military organizations. In the military, the command structure can be clearly differentiated between peace-time (day-to-day operations) in which the administrative and operational chains of command follow a clear hierarchical pattern, and wartime (or combat readiness) structures which require modification in the allocation of authority and responsibility (Gissin, 1977, pg. 52).

Flexibility of a command structure can be defined as the manner and method by which military organization transitions from a peacetime pattern to a high

readiness pattern for combat (Gissin, 1979, pg. 53). Measuring the degree of flexibility can be done by analyzing the length of the chain of command and the range of delegated authority from the top echelon to the lower echelon. The greater the number of intermediate echelons there are between the lower units and the top echelon, the greater the limit will be on flexibility. A command structure where lower operational combat units have a greater extent of authority will improve the degree of flexibility (Gissin, 1979, pg. 53). One could imagine the amount of flexibility an air warfare structure might have in a highly centralized command structure versus one where unit commanders have the freedom to improvise as the combat situations develop.

Each service (or military organization) has a different doctrine with respect to how it makes the transition from peacetime operations to wartime operations. The structures and practices used can vary from bypassing the chain of command -- a concept called skipping echelons which will be addressed later in this thesis -- to high doctrinal emphasis on centralized operational control (e.g., nuclear forces) (Gissin, 1979, pg. 30). Advanced C3 technologies can significantly alter how the distribution of authority and responsibility among different echelons in the command structure of an operational unit is made. It becomes incumbent on those who study C3 technology and develop C3 architectures to evaluate the benefits or troubles new systems may have on how command structure patterns are affected. This is of particular relevance to the contingency operations which will be presented in this thesis.

D. STANDARDIZATION IN C3 - RULES OF ENGAGEMENT

Many problems of C2 in combat operations are not technological in nature. They are conceptual or organizational, or are entrenched in habit, tradition, or come about from long standing ways of operating. Technology can help solve many of the problems, but unless some of the problems' basic causes are understood, technology can actually make things worse. Too much information is worse than too little. Computer equipment and information processors which make information available in vast quantities must also make it possible to sort out that which is important. Otherwise, the commander and his staff may as well stick to manual methods.

A commander who is given his mission and the intent of his superior commander and who has been delegated the authority and responsibility to decide how to operate within that mission (and intent) will be more effective on the battlefield, regardless of the concept of information flow (Gissin, 1979, pp. 263-267). The elements of unpredictability and randomness face every commander. Uncertainty and chaos is normal in war. Information flow in quantity is not necessarily the answer for reducing uncertainty, however, standardization of information in form (and content) often pays dividends toward increasing the commander's decision making effectiveness.

Generating combat information cannot be burdensome for the battlefield commander. It must be beneficial to that commander -- this will serve as an incentive for him to provide it (Beal, 1985, pp. 5-21). The availability of detailed information must not tempt a commander to demand more. Nor is it prudent to issue orders which are appropriate matters for subordinates to decide. This concept

involves an extraordinary level of mutual trust and confidence that information shared will be used to achieve mission objectives and deny enemy exploitation.

It is understood that a rich information system is needed for ROE to succeed. New and advanced technology in C3 systems are said to provide the commander with improved remote control capabilities. But remote centralized control capabilities can be constrained by the fact that the more complex and rapid-paced the battle is, the more critical it is for the commander to have face-to-face briefings with his subordinates prior to mission execution to ensure coordination and complete understanding of common operation procedures (whether they be SOPs, ROEs or combat tactics). There are numerous cases in the Vietnam Conflict where remote control communications capabilities were poor substitutes for direct, face-to-face communications. The operational doctrine of centralized control was practiced in the air war over North Vietnam between 1965-1968. The consequences of restrictive ROEs was increased friction between operational commanders and civilian decision makers in Washington. Detailed ROEs in some instances, curtailed operational flexibility. (Lane, 1981, pg 68-83)

In planning new C3 structures, the enhanced control and communications they provide for senior commanders have to be mitigated by the operational ROEs and procedures (based on the particular characteristics of the combat environment) and by a realistic assessment of the utility provided by the centralized C3 technological capabilities. Command and control technological capabilities may simply be limited by the rules of engagement which may require procedures and modes of operation that are adverse to what the technology permits. (Gissin, 1979, pg. 122)

III. CRISIS ACTION SYSTEM

A. CRISIS MANAGEMENT CHARACTERISTICS

There are a whole range of crises that could potentially face a government. They could mark the beginning of a major conflict (which is postulated to occur in Europe). They could be confrontations between superpowers like the U.S. experienced over Cuba in 1962. They could be Soviet sponsored conflicts, third world conflicts, terrorist incidents, hostile action incidents, military incursions or damaging economic moves. Some are more politically motivated than others, while others can be of a transient nature. In this country, our military command structure is designed for major campaigns in terms of its vertical organization, planning structure and overall military strategies. (Hilton, 1985, pp. 147-178)

As a means of comparison, the attributes of a major campaign include: clear initiation of the event, known enemy objectives, predetermined U.S. objectives, predetermined U.S. military strategy, and less precise NCA control of the operations. On the other hand, the characteristics of a crisis include: ambiguous initiating event, unknown enemy objectives, U.S. objectives defined at the time of the crisis, alternatives and options explored at many levels, and NCA demands of precise control of operations (Stilwell, 1982, pg. 134).

Crises involve requirements which are, in most instances, superimposed on routine day-to-day activities. They usually generate greater pressure on executives and their staffs. Often enough, U.S. security and prestige are on the line. Decisions

24

made are time-sensitive, face the element of uncertainty, and usually are irreversible (due to political constraints). Co-ordination among civil agencies also faces certain time constraints and is often very complex. Every crisis is different and requires a greater need for decisiveness and consistency -- to maintain control and avoid confusion. These general characteristics are dependent on intensity and duration of the crisis at hand. Usually a crisis involves the President of the U.S., and decisions have to be made without the benefit of long review and analysis. This points to the importance of pre-planning, exercise activity and staffing. (Stilwell, 1982, pg. 130)

The first report of crisis, which may come from places other than a U.S. embassy or military command, often contains only sketchy information. Time becomes a critical and sensitive element as (at the national level) the search for additional information gets started. The search for information goes out in all directions in an attempt to initiate the process for developing a plan. Usually pre-planned responses are not appropriate, and the NCA has a tendency to jump the chain of command (Hilton, 1982, pg. 135). This tendency is often acceptable in the quest for information, but many military analysts feel that it could be disastrous if combat is involved (Hilton, 1982, pg. 135).

B.   ROLES AND FUNCTIONS OF THE JCS IN CRISIS MANAGEMENT

A crisis is defined as:

> . .an incident or situation involving a threat to the United States, its territories and possessions that rapidly develops and creates a condition of such diplomatic, economic, political, or military importance to the U.S. Government that commitment of U.S. military forces and resources is contemplated to achieve U.S. national objectives. (Boyes, Andriole, 1987, pg. 249)

A crisis receives intense media attention, and because time can be so sensitive, everyone wants to resolve the crisis in a hurry. The Iranian Hostage Crisis was an exception to this generality. Time is often considered sensitive because a crisis can quickly escalate. National tension is usually high, and military force is either threatened and/or used.

The occurrence of crises is on the rise. Between the 1950s and the 1970s, crises occurred on the average of one per year. In the mid-1970s, the average jumped to three per year. Over the 1980s, the average was nearly six per year. Most of these events (over 80 percent) have occurred in places where U.S. military forces were not in place. As a result, each military response needed to take in whatever C3 system that would be needed. This posed a unique and demanding challenge for C3 planners. Users of C3 systems are increasing the demand for more control, coverage and connectivity. Redundancy and availability of equipment to meet these needs are some of the constraints faced by suppliers. (Boyes, Andriole, 1987, pg. 249)

There are six requirements for crisis management: a basic organization, accurate and timely intelligence, integrated communications, experienced decision makers, data processors/analysts and their supporting staffs, standardized procedures and command and control (Hilton, 1985, pg. 163). The JCS has a number of key responsibilities relative to crisis action (which are contained in Title 10 U.S. Code, DOD directives, and JCS Pub 4) and are listed below (Hilton, 1985, pg. 164):

- monitor world-wide activities; identify potential crisis areas;

- review military plans for adequacy, feasibility and suitability or develop new plans as necessary;

- prepare estimates of situation; develop alternative courses of action/options; state risks;

- provide military advice, options and information to the NCA;

- provide strategic direction to armed forces;

- assign logistic responsibilities to military services and Defense Logistics Agency;

- recommend changes in priorities and reallocation of forces/resources required;

- supervise implementation of integrated plans for military mobilization;

- provide joint intelligence for use within DOD;

- issue operational directives.

The JCS has been closely involved in developing a framework of the Crisis Action System. First, when there is an occurrence of an event (as it fits the definition), a report will be made to the NMCC/JCS. In fact, there are a number of intervening echelons and other agencies that are included in this reporting process. At one of these echelons, the media is usually made aware of the event. The report is then assessed by the JCS, and some preliminary options are developed. Establishing crisis staffing procedures is undertaken by the JCS with coordintion between the military services, other departments/agencies and possibly White House involvement. Next, the JCS will issue a warning order to the unified or specified commanders and a range of response options is developed. The alert order is the final course of action selected by the NCA/JCS. The JCS crisis action planning stops with the order to execute and deploy forces. From here the unified or specified commanders take over and are responsible for operation order (OPORD)

execution and deployment of major forces. This is considered a major element of crisis action because the orders the unified or specified commander gives, and the moves made in engagement, often serve to restrain a crisis, keeping it at the lowest possible level (highly desirable by crisis planners) (Hilton, 1985, pg. 166). Here the crisis either ends or escalates to the next higher level. If it escalates, reinforcement is often required. If it is resolved, then forces are redeployed.

The unified and specified commanders are considered the cornerstone of the crisis action system. They have responsibility for the military operations in their areas of responsibility (AOR) and provide the JCS with vital, on-the-scene reporting and local knowledge. It is the CINC who develops the options from which the final course of action is selected by the NCA in conjunction with the JCS. The National Military Command Center (NMCC) is the hub of the crisis action (on military action).

C. CENTRALIZATION OF DECISION MAKING IN CRISIS

In a major study which analyzed over 200 U.S. crisis operations occurring between 1946 - 1975, it was discovered that the president was involved in over 73 percent of the crises although this involvement was "legally" required in only 22 percent of them. In addition, the study found that centralization of decision making at the NCA level still required extensive interagency co-ordination in over 58 percent of the crises, while only 22 percent of them legally required it. The conclusion reached in this study was that presidential decision making and bureaucratic co-

ordination slowed down the response in such a way as to actually create additional military crisis management problems. (Gissin, 1979, pg. 217)

Despite the apparent effort to centralize control of crisis operation and an increased involvement of top decision makers in the detailed planning of military operations, it is not clear that the ends justify the means. In other words, it is clear from the literature that centralized control does not guarantee or necessarily result in improved management and increased readiness. While past crises can be broadly categorized (e.g., evacuation of U.S. citizens), many are unique in their major elements: i.e., location, force status and readiness, communication facilities and capabilities, political setting, timing and human factors. A unique crisis often requires a unique solution. In addition to strict secrecy maintained by crisis planners, events tend to develop or unfold very rapidly. All these features of crisis operations serve to complicate C3 planning. Consistent C3 doctrine, standard operating procedures (e.g., ROE) and a basic education in C2 for operational and senior echelons are considered critically important in crisis operations. Merely having technological solutions to the communication and control problems is not enough. Close attention must be paid to organizational and institutional problems to better produce response and control mechanisms in crises situations. (Gissin, 1979, pg. 219)

Crisis action planning is described in the Joint Operation Planning System (JOPS) Volume IV. Like JOPS, Volumes I through III, which describe the deliberate planning process, it is driven by Defense Guidance. It uses the same methodical and iterative format found in the OPLANs which are prepared by unified

and specified commanders. In Volume IV, the element of time is compressed into days and hours. The major features of crisis planning that make it quite different from deliberate planning is the number of people involved, the time within which to plan and execute the action, and the frequency of crisis planning activities. From a C3 perspective, another difference is the level of dependence on deployable systems for C2 connectivity. (Boyes, Andriole, 1987, pg. 250)

D. THE CRISIS MANAGEMENT SYSTEM AND THE OSD

If a major crisis arises, the OSD staff must be able to take off its normal hat of policy formulation and review and get with the business of handling the major requirements of the crisis. The SECDEF wears a military hat (next to the president) in his role as member of the NCA. He also has a very important function to perform as head of an executive department. The ability of our military forces to mobilize, marshal, deploy and to be supported and sustained is a function of the ability to get non-defense departments of the executive branch and the industrial base together to do that. The SECDEF has a tremendous number of functions to perform above and beyond pure war-fighting. (Stilwell, 1985, pg. 51)

A crisis management system was developed to plug the gap in the DOD. Its principles include using existing OSD staff organization and relationships, maintaining current responsibilities and authority structures, allowing decisions to be made at the lowest level, complementing the SECDEF's military staff and providing a focal point for OSD activities. The OSD crisis management system has 5 boards,

12 committees, a crisis co-ordination group, a crisis analysis group and a crisis management council. (Stilwell, 1985, pg. 55)

The OSD crisis management system maintains its primary command cell within the Pentagon and can use crisis action elements in the JCS arena. If the OSD was vulnerable and had to deploy, it would either deploy to the Alternate National Military Command Center or the National Emergency Airborne Command Post (NEACP.) In addition to deploying to either alternate, the JCS crisis center could accommodate the OSD team. (Stilwell, 1985, pg. 57)

IV. COMMAND AND CONTROL AND DECISION MAKING

It is useful to examine the C2 process from the perspective of decision making. Decision making can be defined as "the process of identifying and selecting a course of action to solve a specific problem or take advantage of an opportunity." (Stoner, Freeman, 1989, pg. 165) A commander's decision provides the framework within which other organization members make their decisions and act. Problem solving and decision making are considered key parts of a commander's activities. They play a particularly crucial role when the commander is involved in planning. Planning often involves the more significant and long-range decisions that a commander makes. The planning process requires almost a continual series of decision making situations, and it is the quality of these decisions which shape how effective a plan is. (Stoner, Freeman, 1989, pg. 165)

Decision making styles and approaches are wide and diverse, and often must be tailored to fit the specific circumstances. Effective decision makers do not merely wait for a problem to arise; they actively look for problems and opportunities to solve them. (Stoner, Freeman, 1989, pg. 186) Commanders make decisions with varying amounts of information, about conditions that are not always under their control. It is useful to consider approaching decisions as though they were being made under conditions of certainty, risk or uncertainty. Formal problem solving processes are used by most decision-makers because they provide a "rational set of procedures for solving problems." (Stoner, Freeman, 1989, pg. 187) Prioritizing

problems or ranking them in order of importance is also an important element of decision making. It helps a decision maker decide which problems will get their full and immediate attention (Stoner, Freeman, 1989, pg. 187).

A. UNITY OF COMMAND AND DELEGATION

The unity of command principle is a guideline for delegation that states that each individual in an organization should report to only one superior (Stoner, Freeman, 1989, pg. 312). Reporting to more than one superior makes it difficult for an individual to know to whom he/she is accountable and whose instructions to follow. Reporting to more than one superior is also considered to encourage individuals to avoid responsibility, since they can easily blame poor performance on the fact that with several bosses, they simply have too much to do (Stoner, Freeman, 1989, pg. 313).

The delegation of authority by superiors to subordinates is necessary for the efficient functioning of any organization because no superior can personally accomplish or completely supervise all of the organizations, activities or tasks (Stoner, Freeman, 1989, pg. 310). The extent to which a superior delegates authority (and accountability) is influenced by such factors as the culture of the organization, the specific situation involved, and the relationships, personalities and capabilities of the people involved (Stoner, Freeman, 1989, pg. 311).

When used properly, delegation of authority has several important advantages. One advantage is that it can lead to better decisions since subordinates close to the "firing line" are likely to have a clearer view of the facts and situation (Stoner,

Freemen, 1989, pg. 314). Effective delegation also speeds up decision making. Valuable time can be lost when subordinates must check with the "chain of command" before making a decision. This lost time can be eliminated when lower levels of an organization are authorized to make the necessary decisions on the spot (or as the situation warrants). As was stated in the section on crisis management, the element of time is critical. In addition, delegation can cause lower echelons (or subordinates) to accept accountability and exercise judgement. This not only serves to train the lower echelon, but also improves self-confidence and willingness to take initiative. (Stoner, Freeman, 1989, pg. 314)

Delegation is closely related to decentralization in the sense that the greater amount of decentralization for any organization depends on external environmental forces, the organization's size and its culture (Stoner, Freeman, 1989, pg. 324). The advantages of decentralization are similar to those of delegation: unburdening top decision makers; improved decision making because decisions are made closer to the action; better training, morale and initiative at lower levels; and more flexibility and faster decision making in rapidly changing environments. But, total decentralization with no coordination and leadership from the top would clearly be undesirable. The very purpose of organization would be defeated without some form of centralized control. (Stoner, Freeman, 1989, pg. 324)

Advancements in information technology make it easier to decentralize. These advancements in information systems allow some processes to be centrally controlled, but permit decentralizing decision-making to those echelons closest to the action. As the U.S. military goes through its restructuring, the trend toward

decentralization will undoubtedly create some debates. Information system technology, while making decentralization in vogue, can also mean more sophisticated centralized control systems. (Stoner, Freeman, 1989, pg. 321)

B. ECHELON SKIPPING

The capabilities that are provided by advanced information system (C3) technologies enable senior commanders to reach down the chain of command and communicate directly with action level units in order to gain information or quick response from those forces (Gissin, 1979, pg. 238). When this command bypassing (or skip-echelon) is used extensively by senior commanders without adjustments to the doctrine, or adjustments in the allocation of authority and responsibility in the operational chain of command, any error could have potentially disastrous results (Gissin, 1979, pg. 30). In addition, it can produce tensions among intermediate (or successive) levels, contribute to confusion and conflicting reports, and deprive senior commanders with important information available at the intermediate levels (Gissin, 1979, pg. 30).

Refinements in C3 technology have enhanced the ability for senior echelons to get closer to real time contact with operations. Real time high echelon battle management is possible, but it can also mean that those at the bottom might hold back information to prevent the higher echelons from getting the temptation to make tactical decisions. (Beal, 1984, pg. 14)

Uncertainty is one thing that every echelon in the chain of command must contend with. Information denial creates higher levels of uncertainty. Synthesized

and integrated information reduces this uncertainty. Information systems which support C2 are characterized by horizontal information flow. A commander at whatever echelon who delegates authority and establishes accountability expects feedback. This delegated authority feedback loop is what the top decision maker wants to know most about. Once he is denied information, the tendency is to start looking at tactical matters because they will be the ones he can look at without the integrated information needed to make macro-level decisions. (Beal, 1984, pg. 10-15)

It is suggested here that the relationships between successive echelons in the chain of command and the strong bonds of trust and confidence between senior and operational commanders, may be negatively affected by excessive use of advanced C3 technology to skip echelons. The number of echelons that can be skipped without creating information abnormalities varies according to the chain of command size and the C3 doctrine used by an organization. Clearly this issue is one which can produce adverse consequences if not carefully c~ ~.d. (Gissin, 1979, pg. 311)

C. DECISION MAKING THRESHOLDS - SPAN OF CONTROL

Span of control refers to the number of subordinates who report directly to a given superior (Stoner, Freeman, 1989, pg. 293). Early researchers tried to establish a universal rule concerning how many subordinates one person could effectively supervise. Today, it is recognized that the optimum number varies with the situation (Stoner, Freeman, pg. 294). In a military environment, this implies that effective

command of personnel is constrained by the span of control of a commander. The solution that most modern military organizations adapted was (similar to that proposed by Carl von Clausewitz) the staff system. This system permits a commander to retain his command privileges while maintaining his span of control through a staff that monitors and supervises other activities (e.g., personnel) (Gissin, 1979, pg. 165). Actually, the concept of using advisory staffs by decision makers is recorded throughout history. A staff provides a wide variety of expert help through planning research, analysis, options development, policy implementation, monitoring and control of certain functions. (Stoner, Freeman, 1989, pg. 309)

With advancements in modern C3 system technology and the increased complexity of warfare, the size and diversity of a staff can become very large. Consequently, a commander may be required to spread his span of cc urol over a large number of staff specialists and subordinate operational commanders. Despite the advantage of having a "shorter" chain of command, the commander may be facing less direct contact or command relationships with his combat commanders. Diverting more of one's span of control to a staff will undoubtedly improve effectiveness of transmission of orders and directives, but there are trade-offs. As Clausewitz states:

> There is no denying that the supreme command of an army is markedly simpler if orders only need to be given to three or four men; yet a general has to pay dearly for that convenience in two ways. First, an order progressively loses speed and vigor and precision the longer the chain of command it has to travel. Second, a general's personal power and effectiveness diminishes in proportion to the increase in the sphere of action of his closest subordinates. (Gissin, 1979, pg. 165)

Decision thresholds define the limits of authority and decision making responsibility of a given echelon in the operational chain of command (Gissin, 1979, pg. 55). These decision thresholds can vary from highly detailed and structured to flexible and open. It depends a great deal on the traditions and doctrines of an organization as well as type of mission, availability and accuracy of intelligence, level of accepted risk and uncertainty, and political issues of concern (Gissin, 1979, pg. 56). Rigid and structured decision thresholds restrict the amount of discretionary authority given to on-scene commanders, while flexible and open decision thresholds provide wider latitude to operational combat echelons in making tactical decisions. The flexible and open decision thresholds also foster independent decisions which permit the on-scene commander to seize the moment and initiate action based on the unpredictability of combat (Gissin, 1979, pg. 57). Whether a military organization centralizes its detailed planning at the top or sees that every plan is a basis for change is a function of its general operational philosophy of planning military operations (Gissin, 1979, pg. 58).

D. ROLE OF DECISION SUPPORT SYSTEMS IN DECISION MAKING

A decision support system (DSS) is an interactive computer system that is easily accessible to, and operated by, noncomputer specialists to assist them in planning and decision making functions (Stoner, Freeman, 1989, pg. 672). The decision making function allows the user to simulate problems using formal mathematical models (e.g., combat models) and to test the outcomes of various alternatives for reaching the best possible solution (Stoner, Freeman, 1989, pg. 673).

While DSSs are currently being widely adopted, the development of expert systems (ES) are the newest trend in tools for improving organizational decision making and control (Stoner, Freeman, 1989, pg. 674). Expert systems are also called "knowledge-based" systems since they are built on a framework of known facts and responses to situations. These systems are also called "artificial intelligence" (AI) which refers to the use of computers to simulate characteristics of human thought by developing computational approaches to intelligent behavior (Stoner, Freeman, 1989, pg. 675).

Expert systems perform similarly to human experts. They can diagnose problems, recommend alternative solutions, offer justification for their recommendations and learn from previous experience by adding information gained in solving problems to their data base (Stoner, Freeman, 1989, pg. 675). The application of computer technology to management of information and decision support systems has a profound effect on how tasks are performed and how organizations behave (Stoner, Freeman, 1989, pg. 680). The principal effect is that organizations can process and create paperwork with increasing accuracy and speed. The roles of superiors and subordinates and the structure of the organization may also be affected, but in most studies, it was found that computerization tends to lead to an increase in the number of echelons. Access to information can also strengthen the positions of subordinates (Stoner, Freeman, 1989 pg. 680).

In a review of the literature on the subject of DSS and computerization, it was found that computer-based information systems do not necessarily greatly affect organizational structures. In fact, in some cases, they reinforce existing structures. While computerization can increase "top-down" communication and top-level

monitoring of operation activities (steps toward centralization), it also provides for decentralization at middle echelons through interorganizational networking. (Stoner, Freeman, 1989, pg. 681)

Effective planning, decision making and control are based on effective management of information. All military organizations have formal and informal information systems. Computer-based information systems like DSS are evolving to ES (AI), but the value of information supplied by these systems depends on quality, quantity, timeliness and relevance to action (Stoner, Freeman, 1989, pg. 683). The information needs of individuals differs with their hierarchial level. Top echelons require information for strategic planning. Thus, their information sources are largely external. Middle echelons need both internal and external sources, and generally require more rapid information flow. Lower level echelons (tactical) are concerned with operational control and need frequent, highly detailed and accurate information -- predominantly from internal sources (Stoner, Freeman, 1989, pg. 684). Application of computer based DSS or AI systems is promising for the future and may bring about fundamental changes in the way C2 of forces is performed. It is important to understand the effects that advancements and applications from the continuing computer revolution may have on military organizations. Needless to say, computers can liberate one from many boring and routine tasks, giving the opportunity to use information more creatively and productively.

E. ORGANIZATIONAL AND INFORMATIONAL DECISIONS

Operational commanders assume that the decisions they make will be operationally oriented because they result in orders and directives to subordinates to achieve specific operational objectives. These operational decisions are viewed by the commander as the "basic stuff of the function of command." Prior to making any operational decision, a commander will have made decisions of two other types: organizational and informational. Organizational decisions establish a chain of command for the execution of operational decisions. Organizational decisions also establish the structure for the flow of information and for intermediate processing of information required for decision making. Information decisions are those decisions made by a commander based on what he believes the situation to be. These decisions usually precede the operational decision about what action should be taken. (Boyes, Andriole, 1987, pg. 18)

Organizational decisions establish command and reporting relationships that create communications requirements -- not only in the physical sense, but in a common language, too. Organizational decisions help shape C3 system development, and because they commit C3 resources, commanders need to be aware of capabilities and limitations of the C3 resources at subordinate levels (Boyes, Andriole, 1987, pg. 18). C3 systems are generally devoted to supporting information decisions.

Information seldom moves directly from sensor to decision maker without filtering, correlation and analysis. These intermediate "nodes" are an important part of the C2 process. Removing redundant reports, or those that are not relevant, is

41

an important control mechanism. Correlation of information is essential to reduce any of the uncertainty that may surround conflicting reports. Correlation attempts to establish positions, courses, speeds, identities, and even readiness -- by relating several reports on the same target. Drawing inferences from these correlations as to what an enemy's intentions might be is equally important in this process. Often the C3 organization that does this business of filtering, correlating and analyzing is not in direct control of the ultimate decision maker. It is therefore essential to ensure that similar priorities are shared between all levels in this process. (Boyes, Andriole, 1987, pg. 20)

V. COMMAND AND CONTROL POLICIES -- THE UNIFIED AND JOINT ARENAS

Unified operations and joint actions generate certain unique C2 requirements: integrating efforts toward a common objective, planning and conducting operations under unified direction, developing doctrine for preparing and training for specific types of combat actions, and defining responsibilities and developing doctrine for unified operations (Cardwell, 1984, pg. 96). The principle of support is considered extremely important in conducting joint or unified operations. This principle states that forces of one service shall be trained and, as necessary, be employed to support and supplement another service in carrying out its functions (Cardwell, 1984, pg 96). The principle of full utilization of forces includes: strategic direction of the armed forces, unified command operation of forces, integration of the military services into an efficient land, naval and air team, prevention of unnecessary duplication and overlapping of effort among forces, and co-ordination of operations to avoid gaps and maximize efficiency (Cardwell, 1984, pg. 97).

There are a number of factors which are considered when determining the most effective method to coordinate the forces of two or more services. First, a comparison should be made as to the mission to be accomplished with the capabilities and functions of the services involved. Second, the geographic location ,and nature of anticipated level of operation must be considered. Third, the character, strength and capabilities of the U.S. force versus those of the enemy should be examined. Finally, a decision must be made to determine the nature and

size of the forces to be furnished by each service and type of command involved (Cardwell, 1984, pg. 97).

The functions involved in a military action define the service identity of the commander. Normally, missions requiring operations of one service force will be assigned to the component commander of that service. The exact role of each service in future conflicts cannot be fully predicted, and assignments of primary functions are not intended to be "written in stone" with regard to command structure or other relationships. In the event of a major emergency in his AOR, a unified commander is authorized to assume temporary operational control (OPCON) of all forces (unless those forces have been previously committed). (Cardwell, 1984, pg. 97)

A joint task force (JTF) is a force composed of assigned or attached elements of the U.S. Army (USA), U.S. Air Force (USAF), U.S. Navy (USN), and U.S. Marine Corps (USMC), or two or more of these services. It is constituted by the SECDEF or by a unified or specified commander. A JTF, unlike a subordinate component command, is not a permanent command arrangement. The JTF is established when the mission has a specific limited objective and is "dissolved when the purpose for which it was created has been achieved." (Cardwell, 1984, pg. 62) Like a component command, the commander of a JTF exercises OPCON over his entire force (Cardwell, 1984, pg. 78).

A.   COMPARISON OF U.S. SERVICE DOCTRINES

The Navy and Air Force view combat and war fighting from a theater point of view. The Army views combat in a context where the corps is the highest tactical

fighting element, but the Army fully supports the concept of an echelon above the corps level (Cardwell, 1984, pg. 30). The Marine Corps views combat from the position of a single service performing a single assigned mission. The Marine Corps perspective is that of an "integrated, combined arms force -- the Marine air-ground task force -- which is task organized to perform a specific mission." (Cardwell, 1984, pg. 35) It is these somewhat differing views of how forces should be organized for theater warfare that the services bicker about, and their written doctrine support these opinions (Cardwell, 1984, pg. 41).

Naval forces are arranged to conduct sea control and power projection. Air Force structures are designed to support surface (land and sea environments) operations and to execute the air mission. All of the services espouse the principle of unity of effort which specifies that military forces should be "integrated into an efficient team of land, naval, and air forces." (Cardwell, 1984, pg. 40)

Each service applies the principle of unity of effort somewhat differently. The Army, Air Force, and Navy agree that one single commander (theater or joint force) should exercise OPCON of theater assets through his component commanders (i.e., land, naval and air component commanders). The Marine Corps believes that its combat forces should report directly to the theater or joint commander and be employed by the USMC component commander (Cardwell, 1984, pg. 41). The Navy and Marine Corps believe in a service component (USA, USAF, USN and USMC), while the Army and Air Force believe in functional components (air, land and naval) (Cardwell, 1984, pg. 38).

The Army and Air Force believe that land forces should come under the land component, air forces under the air component, and naval forces under the naval component (Cardwell, 1984, pg. 38). Both agree that the Marines should come under the naval component in amphibious operations (or in those actions in support of naval campaigns). They also agree that Marine forces should be assigned to OPCON of the land component when assigned to sustained actions.

The Navy believes that all naval assets, including navy air, should report through the naval component commander. This includes when naval air assets are deployed over land in support of the airland battle -- that is, they would only operate in a support role (Cardwell, 1984, pg. 35). The Navy supports the concept of a single aviation assets manager. The Marines support the principle of the unity of effort but only through a marine force component commander. When operating in an amphibious role, the marine forces would come under the naval component or unified commander (Cardwell, 1984, pg. 37). The Marine Corps does not agree in the concept of a single commander for air unless that commander is the Marine Air-Ground Task Force Commander (Cardwell, 1984, pg. 37).

All four services agree with the principles of combat and war fighting as delineated in JCS publications, but apply these principles in varying ways. These differing perspectives have contributed to the current lack of a coherent command structure which is based on the unity of command principle (Cardwell, 1984, pg. 44). To accomplish war fighting objectives (assigned by political entities), a theater command needs a coherent approach. This approach requires, at a minimum, a detailed knowledge of warfare, service doctrine, tactics, own force capabilities,

enemy force capabilities and history. If U.S. doctrine is to support military objectives, then command structures for theater warfare need to be aimed toward a unified approach. (Cardwell, 1984, pg. 72)

B. THE JOINT TASK FORCE APPARATUS

In establishing a JTF, the establishing authority usually notifies the appointed Task Force Commander whether sufficient qualified officers can be made available to form a JTF staff or whether augmentation of his existing staff by officers of other services is to be the basis for creating the joint staff (AFSC Pub 1, 1984, pg. 28). The JTF commander has full OPCON of all forces assigned. This OPCON permits him to assign tasks, designate objectives, and direct the operational aspects of an operation. It includes the authority to vary the internal task organization of his force (AFSC Pub 1, 1984, pg. 137). When the specific limited objective has been accomplished, the JTF is dissolved and the assigned forces usually revert to their former status.

This next section will address the issue of jointness among the military services. The author believes that although four-service joint operations are practical where joint control is required because of geographic span of theatre and encompassing both naval and continental operations, operational effectiveness and efficiency can be impaired when jointness is overused. There are many low level conflict situations where maximum service participation may not always be the best option. As past operations point out, mission requirements could have been met and better served without resorting to a four/multi-service joint operation. Unfortunately, there seems

to be a mind set in the unified command structure that maintains that all military operations must have all four services represented. This mindset causes a service component's capability to conduct a broad range of missions to be ignored or duplicated for sake of maximum service participation and as a result, operational effectiveness and efficiency can suffer.

For the sake of clarity, the author is not advocating single component operations as a rule, nor is the suggestion to dismantle the joint structure. On the contrary, the overall joint concepts of pursuing national security goals is valid and makes a lot of sense, under certain conditions.

The criterion for determining force mix should be mission requirements. Planners and decision makers on the Joint Staff or the Unified Command Staff in their review of operations or contingency plans or during crisis situations must evaluate each service's participation and use only that service component whose capability best fulfills mission requirements. There are numerous scenarios which lend themselves to the capabilities of only one or two service components, particularly in crisis situations. If service component capability is ignored or duplicated for the sake of having maximum service participation, mission accomplishment can be jeopardized. (Wilson, 1984, pg. 1)

Maximum service participation in joint operations is necessary and practical where joint control is required due to the geographical span of the theatre. Since World War II, geo-political realities have forced the U.S. into simultaneously being a global maritime and continental power. This situation requires that our military be prepared to wage both naval and continental warfare, with the Army and Air

Force oriented toward continental warfare, and the Navy, Marine Corps team oriented towards naval warfare. The task that is faced by military planners is how and when to integrate continental and naval forces in response to a mission. (Wilson, 1984, pg. 4)

To overcome what has been termed an over-jointness problem, there are several considerations that should be made. First, the functions involved in an operation -- military or continental -- should determine the nature of the forces involved. When and where possible, a unified commander should make use of existing service-developed skills. Second, the command element of a joint force should possess the skills and doctrinal expertise to deal with the nature of the operation. This is best achieved by assigning command of the JTF to a commander of the service component possessing the best means of achieving the operational objective. Finally, it is essential to develop joint doctrinal guidance for integrating the functional capabilities of the components into a cohesive concept of operations that can be used by joint planners and decision makers. (Wilson, 1984, pg. 5)

C. DEVELOPING C3 DOCTRINE

From a C2 point of view, effective use of the potential capabilities of the newest weapons systems is a function of the ability of a combat organization to develop a flexible, operational C3 doctrine. What is meant by a flexible doctrine is one that would strike a balance between the requirements for centralized control and the demands for flexibility and command authority to lower combat echelons. Developing such a doctrine faces certain constraints. First, are the complexities and

uncertainties of future battlefield conditions. Second, are the seemingly conflicting requirements posed by different weapons systems technologies under development. Growing complexity of weapons systems and the requirement for interoperability between different service components seem to mandate a centralized control system. On the other hand, with the ever-increasing action-reaction cycle, constant improvements in air-launched/ground-based weapons, and more sophisticated C3 counter measures, a flexible operational doctrine which encourages lower combat echelons to seize the initiative and carry out improvised military action makes more sense. (Gissin, 1979, pp. 158-159)

At a minimum, it is apparent that a flexible, operational C3 doctrine would require planners and commanders to develop operational procedures which would allow lower combat echelons to function with minimum essential communications. Planners of military operations must somehow understand the uncertainties and risks associated with a dynamic battlefield environment. Communications are vulnerable to exploitation, disruption, physical attack and interruption. They can also suffer from information overload which reduces response time. In planning for future combat, the issue of "probable system breakdown" must be considered. It is the author's opinion that too many of the military planners tasked with C2 ignore this, maintaining the false assumption of a low probability assigned to the vulnerability of C3 systems. (Gissin, 1979, pp. 151-157)

VI. CASE STUDY NUMBER ONE

A. IRANIAN HOSTAGE RESCUE ATTEMPT - OPERATION EAGLE CLAW

1. Introduction

On the morning of 24 April 1980, in an Iranian desert approximately 265 miles from the city of Teheran, a team of 130 Army Green Berets, Rangers, drivers and translators, and 50 pilots and air crewmen aborted their mission to rescue 53 Americans being held hostage by militant Iranian students. The decision to abort was made by Colonel Charles A. Beckwith, USA, the on-scene commander. The events leading up to this decision are the subject of this case. The rescue attempt, also known as the "debacle in the desert," left eight U.S. servicemen dead along with the abandonment of five helicopters, weapons, communication equipment, classified documents and maps. Of the military operations conducted by the U.S. between 1970 and 1984, none so clearly marked the decline of American military prestige and competence as the unsuccessful attempt to rescue the 53 Americans being held hostage in the U.S. embassy in Teheran. (Gabriel, 1985, pg. 85)

The unsuccessful mission in Iran seemed to dramatize the inability of U.S. military planners to devise and execute an operation for which they had nearly six months to plan for. In the days immediately following the attempted raid, the press, the American public, the Pentagon, and the U.S. government blamed the failure on bad luck (Gabriel, 1985, pg. 85). In the years that followed, when classified

information on the mission became accessible to public viewing, it then became much clearer that the failures experienced by the task force had little to do with bad luck (Gabriel, 1985, pg. 86).

The mechanical failures and other equipment shortfalls that plagued the mission seemed to indicate that the U.S. had lost its technological edge. The world wondered how a country that could land a man on the moon and was among the most technologically advanced could fail to fly eight helicopters 540 miles against no enemy opposition, and suffer equipment failures that resulted in a mission abort. Furthermore, once having made the decision to abort, the U.S. military could not even evacuate the area without killing its own soldiers, or leave undetected. When it was all over, the impact of the failed raid contributed to President Carter's demise in the White House. (Anno, Einspahr, 1988, pg. 3)

2. Background

In November 1979, the American embassy in Teheran was attacked and captured by a band of Iranian Revolutionary Guards. They were considered the most militant and radical arm of the Ayatollah Khomeini. As the hostage situation dragged on, the Ayatollah took full advantage of the U.S. reluctance to take direct action against Iran and gained domestic and international propaganda attention. In the early days of Iran's revolution, there were still factions of moderates within the government who repeatedly promised that the hostages would not be harmed and would attain release through diplomatic means. President Carter was committed to a peaceful solution and openly rejected the use of military force to rescue the hostages or punish the new regime. (Gabriel, 1985, pg. 86)

From the very beginning though, officials within Carter's administration encouraged military action. The military did not possess any sort of contingency plan to deal with a situation that arose in Teheran. Furthermore, the Pentagon and staff of the JCS did not have any planning organization to deal with a "commando-style raid." Later, when the decision was made to initiate military action, a staff structure within the JCS had to be created. (Anno, Einspahr, 1988, pg. 5)

In November 1979, the White House directed the JCS to assemble a staff and develop contingency plans. In December, the rescue force selection had been completed and training exercises started. At the very beginning, the plan was to develop separate components of the rescue force in different locations rather than bring them together. Two of these components trained at their home bases to maintain some level of secrecy about the operation. In March 1980, the last training exercise was conducted, and one month later the JCS reviewed the final plan to rescue the hostages. The JCS approved the plan and recommended it to the President, who approved it that same day. One week later, having successfully deployed the forces to their staging areas (undetected), the assault force rendezvoused at a small air strip in Iran's Great Salt Lake Desert. (Gabriel, 1988, pg. 87)

3. The Mission

The rescue plan called for six C-130 transport aircraft staging from Masirah to lift the men, equipment and helicopter fuel and fly to a secret landing strip in Iran designated "Desert One." (Ryan, 1985, pg. 2) Three of the C-130s would carry the 118-man assault team and a smaller force, a road-watch team to

provide security at the desert landing spot. The other aircraft contained the extra fuel needed for the RH-53D helicopters -- which had been launched from the Carrier U.S.S. Nimitz (located in the Arabian Sea) three hours earlier. This was the second element of the plan. The eight helicopters were to rendezvous at Desert One with the C-130s, refuel, transfer men and equipment, and then continue with the next phase of the operation. Those helicopters were to fly beneath the radar coverage of Iran using only night vision devices and dead reckoning. Desert One was located near a small village in the middle of a desert about 500 miles inland from the Persian Gulf. The flight time until rendezvous for the helicopters was approximately five and a half hours.

Once the rescue force transferred from the transports to the helicopters, the plan called for the helicopters to proceed to a site called "Desert Two." This mountain hideout was approximately 50 miles from Teheran. Still in darkness then, the assault force would spend the night and all the next day resting and making final preparations. The helicopters were to be flown to another hideaway about 30 miles outside Teheran and wait until they were called to recover the raiders and hostages in Teheran. Evening the next day, the commandos would be secretly driven into Teheran in trucks and vans by a four man group of Army special forces agents who had been in place ten days in advance of the raid to support the rescue. There was also another platoon size force of Army Rangers who were near the Desert Two site. They were responsible for preparing the way for a larger Ranger force of company strength to attack and seize a small airstrip from which the hostages and rescue team

from the helicopters was to be airlifted out by two C-141 aircraft. (Gabriel, 1988, pp. 89-90)

Once inside the city of Teheran, the assault force would divide into three separate teams. One of these teams would be responsible for rescuing the U.S. charge d'affaires and two other diplomats held hostage in the foreign ministry building. The remainder of the force, split into two groups, would be responsible for storming the embassy, immobilizing the guards, and rescuing the hostages. Intelligence sources had been able to size up the guard force, and this part of the operation was considered the easiest to execute. As soon as the assault was under way, the helicopters would leave their hiding place and proceed to separate landing zones within the city. It was in the plan that six operational helicopters were needed to execute the second element of the plan, although eight were deployed from the carrier. Only five helicopters were actually needed in the city to recover the team. (Gabriel, 1988, pg. 91)

If the rescue force was surrounded by an angry and hostile Iranian mob, two circling AC-130 gunships would provide aircover. Meanwhile, the company-size element of Rangers would be airlifted from Egypt and proceed to isolate the Manzariyeh airstrip about 35 miles outside Teheran and await the arrival of the C-141s. Naval air support and AC-130 gunships were also on call to provide air cover should the helicopters come under attack. The helicopters, once clear of the city, would proceed to the airstrip and waiting C-141s. Navy fighters and bombers would cover the evacuation and suppress any Iranian ground or air reaction. The

helicopters would then be destroyed by their crews, and finally, the C-141s would take off to return to Egypt. (Gabriel, 1988, pg. 92)

4. Command Relationships

Soon after the decision was made to rescue the hostages by military action, General Edward Meyer, Army Chief of Staff, nominated Major General James Vaught, USA, to lead the task force. He was confirmed on 12 November 1979. However, the JCS by then apparently had made a conscious decision not to use the existing JTF structure (Anno, Einspahr, 1988, pg. 7). The JCS were concerned with security of the mission. They believed the use of the JCS Crisis Action System procedures would involve too many people to protect secrecy. This fundamental decision forced Major General Vaught to create an entire ad hoc organization (Anno, Einspahr, 1988, pg. 7).

In the course of the next several months, operational and training requirements fluctuated as the rescue plan was developed and revised. The military chain of command also evolved. Initially, Major General Vaught had no deputy. He worked directly with Colonel Charlie Beckwith, USA, Commander of the Delta Force assault team who would perform the main rescue action and with Colonel James Kyle, USAF, who was in charge of the C-130 pilots and air crew training. Later, Colonel Charles Pittman, USMC (special assistant on General Meyer's staff), was ordered by Meyer to "become involved in the planning and execution of the helicopter phase" of the operation (Anno, Einspahr, 1988, pg. 8). Although Pittman was never formally assigned to the ad hoc "joint task force," by mid January 1980, he had in effect established himself as the helicopter force leader. The situation was

further confused when later, Lt. Colonel Seiffert, USMC, was designed by Major General Vaught as the helicopter flight leader. Unfortunately, these command relationships remained confused and unclarified during the majority of preparation time for the rescue. During the actual operation, Pittman was indeed the deputy commander for helicopter operations and reported directly to the task force commander. Lt. Colonel Seiffert reported directly to Colonel Pittman. (Anno, Einspahr, 1988, pg. 8)

Compounding this situation further was the introduction of Major General Philip Gast, USAF, (by the JCS) to the chain of command, as a special consultant to the task force. He had been to Teheran and it was thought that his experience could assist in the planning phase. He was promoted to Lt. General on 1 April 1980, and subsequently was appointed Deputy Commander of the task force, even though he outranked the commander. Apparently Major General Vaught never formally spelled out the command structure to his task force from himself downward. Several informal mid-level command relationships formed over time. Responsibility for training and planning were also informal and conducted on a decentralized basis. This structure hampered the training and planning necessary to attain the required mission capability and proficiency. (Ryan, 1985, pg. 27)

Unfortunately, the command and control arrangements used to execute the actual operation were also flawed. At no time during the nearly six months of training and preparation nor during the operation itself was there a single mission commander designated (Anno, Einspahr, 1988, pg. 9). There was Major General Vaught, with overall control, but he was in Egypt nearly 1,000 miles away from the

action; there was Major Bill Fitch, USA, the Desert One site security officer; there was Lt. Colonel Seiffert, the helicopter flight leader; there was Colonel Kyle, the C-130 and landing zone support commander; and there was Lt. Colonel Beckwith, the ground forces commander. But there was no individual deployed with the force who was responsible to integrate and coordinate the efforts of all these elements (Anno, Einspahr, 1988, pg. 9).

Operational control arrangements for the mission were confused as well. Colonel Kyle was the landing zone commander, but Beckwith was the only individual on site with go/no-go decision authority for the mission (Ryan, 1985, pg. 17). Complicating Beckwith's authority was the extensive up-channel reporting and monitoring network. This network included at least the U.S.S. Nimitz, an E-3 AWACS, the commander of the task force in Egypt, the Pentagon and the White House.

President Carter firmly insisted that the lives of the hostages be protected, and to do this he demanded that absolute secrecy be observed and the size of the assault force be kept to an "absolute minimum." (Ryan, 1985, pg. 18) General Vaught was responsible for maintaining security by ensuring that no single group was knowledgeable of operational details of another group unless there was an absolute need to know (Ryan, 1985, pg. 20). This procedure is known as compartmentation. The JCS issued specific orders on matters of task force organization and security, and these served to constrain what Vaught was and was not authorized to shape in his rescue plan.

Attaining the "special mission" capability and qualifications required of the marine pilots who were chosen for the helicopter phase had no precedent, and with limited amount of information to draw from, training and perfecting techniques were compressed into only four months time. This operation was considered high risk, complex and the overall probability for success could only be guessed (Ryan, 1985, pg. 26). Both Gast and Pittman were often at odds on the conduct of the helicopter training. Pittman was also in the position of having to report formally to Vaught and informally to Gast (prior to his appointment as Deputy Commander). Procedures and policy, as well as uncovering potential weaknesses in the training emphasis, were responsibilities shared at three separate and distinct levels. Neither Kyle nor Beckwith had to contend with the dual reporting requirements faced by Pittman.

The criteria for six operational helicopters for the mission had been firmly established in this chain of command. It had been determined early in the operational planning stages that due to weight and lift capabilities, a minimum of six helicopters would be required to carry out the actual rescue. As it turned out later, this criteria came under "reconsideration" as far up the chain of command as the White House. (Ryan, 1985, pg. 84)

5. Command, Control, and Communications

General Vaught chose not to use the fully staffed and integrated intelligence component operating for the JCS. Instead, he nominated his own staff intelligence officer and provided him with a small staff (Ryan, 1985, pg. 31). The Defense Intelligence Agency (DIA) also had the capability to provide an interagency

Intelligence Task Force (ITF) but was not tasked by the JCS. The ITF, through the director of the DIA, is directly subordinate to the JCS and can, on short notice, assemble and organize selected units of the U.S.'s entire intelligence community (Ryan, 1985, pg. 31). Vaught's J-2 could have had unlimited access to the ITF sources with the burden of responsibility on intelligence resting with the DIA director who would have headed the ITF. As it was, Vaught allowed intelligence matters to demand more of his personal attention than with training (Ryan, 1985, pg. 32). Vaught's J-2 did establish liaison with the Central Intelligence Agency (CIA), DIA, National Security Agency (NSA), and the State Department's Bureau of Intelligence and Research, but these liaisons were at a much lower and informal level than what could have been centralized at the three-star level by the director of the DIA.

Compartmentation imposed by security also constrained the intelligence staff of Vaught's organization. Weather officers, who were aware of the possibility of severe dust storms in the Iranian desert, were not permitted to communicate this information to the helicopter pilots (Ryan, 1985, pg. 33). Most intelligence support personnel outside the intelligence staff never received a complete brief on the mission, and the intelligence system became unresponsive due to administrative red tape (Ryan, 1985, pg. 33).

Vertical communication elements were established early-on in the planning stages. The training site for the rescue team was equiped with secure telephone and message communications. Satellite communications (SATCOM) systems linked the geographically separated chain-of-command to the operational

units. General Vaught was to direct this complex rescue mission form his command center located in Egypt. SATCOM would interconnect him with his operational commanders, the Nimitz battle group in the Indian Ocean, and the NCA/Pentagon (Anno, Einspahr, 1988, pg. 13). Supplementing the SATCOM link throughout the raid was an E-3 AWACS aircraft which could function as a C3 relay platform.

Internal and lateral communications among deployed field elements were limited. Equipment incompatibilities existed among Air Force, Army and Marine units, and procedural constraints imposed by operational security (OPSEC) measures were strict. Army Rangers who were to provide the perimeter security for Desert One site had radios which could not communicate with the C-130 or RH-53D pilots. When Iranian nationals showed up in a bus on a road overlooking Desert One, this information along with the status of the Ranger Force could not be relayed directly to Kyle or Beckwith. They used a messenger to run information back and forth (Anno, Eisnpahr, 1988, pg. 13). Compounding matters more was that the Desert One site could not communicate directly with the helicopter force. Furthermore, the helicopter pilots were under strict orders to maintain radio silence throughout their flight (Anno, Einspahr, 1988, pg. 14).

6. Mission Abort and Tragedy

The first C-130 to arrive at Desert One contained Colonel Beckwith, Colonel Kyle, and some members of the assault force. This team was responsible for controlling air traffic, securing the site's perimeter and establishing a road watch. Almost immediately after posting guards on the road, an Iranian bus with passengers was stopped and held by Rangers. Beckwith radioed Vaught with this

news. The White House was apprised by the Pentagon and agreed to hold the witnesses until after the operation was over. Within the next few hours, the first two C-130s had discharged all members of the assault force and departed, leaving four C-130s (three loaded with fuel) at Desert One.

For the helicopter force, things were going wrong in a hurry. Two hours into the mission form the aircraft carrier, the pilot of helicopter #6 had to land his aircraft due to indications of mechanical failure of the main rotor spar. Helicopter #8 observed #6 land, and as wingman, he too landed to provide support. The decision was made to abandon #6 and proceed in #8. The crew of #6 removed all classified material but did not destroy the aircraft for fear of alerting the Iranians (Ryan, 1985, pg. 69).

One hour later, all seven helicopters flew into an unexpected dust storm. For the next couple of hours, the helicopters flew by instruments and became separated. Helicopter #1 landed and the pilot, Lt. Colonel Seiffert, radioed by special radio channel to General Vaught to inform him of the situation. Helicopter #2, his wingman, also landed. Vaught and Seiffert agreed that despite the storm, the helicopters could proceed. No one was yet aware that helicopter #6 was down. (Ryan, 1985, pg. 70)

As the helicopters battled their way through the storm, helicopter #5 suffered a casualty to its navigation and flight control system. Colonel Pittman was onboard this helicopter. Poor visibility, disorientation, and the loss of instruments forced the pilot to abort and return to the carrier. Because of radio silence, none of the helicopters knew of the loss of two of the force. Furthermore, because there

were no communications with Desert One, no one was aware that the dust storm was not affecting the site--in fact, it was a clear night there (Ryan, 1985, pg. 80). Had the pilot of #5 known this, he would have proceeded to Desert One. To make matters worse, #5 contained all of the helicopter spare parts and maintenance equipment. (Gabriel, 1985, pg. 114)

Nearly ninety minutes behind schedule, six of the original eight helicopters finally arrived at Desert One. Helicopter #2 reported that its hydraulic system was out of commission. The mission was now down to only five helicopters. Without any spare parts, the repair effort was impossible, and mission abort became inevitable. Both Beckwith and Kyle conferred and agreed to abort. Kyle radioed Vaught, who in turn radioed the Pentagon. The White House agreed with Beckwith's recommendation because "he was the only man qualified to make the decision." (Ryan, 1985, pg. 85) Vaught and White House representatives both briefly considered recommending to President Carter that the mission proceed with only five helicopters. In fact, Vaught asked Beckwith to reconsider, but Beckwith reminded him of anticipated additional mechanical problems and probable helicopter losses in Teheran (Ryan, 1985, pg. 84).

While this information exchange was taking place, the helicopters proceeded with the refueling operation. It was while helicopter #3 was repositioning that it crashed into a C-130. The C-130 exploded, killing five Air Force men. Three Marines died in helicopter #3. Several men suffered serious burns while escaping the burning C-130. As the fires raged, Kyle gave the order to evacuate as quickly as possible and not take the time to destroy the helicopters. The three remaining

C-130 crews jettisoned jeeps and motorcycles to make seating room for the men, and thirty minutes after the crash, they were airborne. The flight out of Iran proceeded without further incident. (Ryan, 1985, pg. 91)

Colonel Kyle was not aware that the helicopters contained classified documents and countermanded one of the pilot's orders to his crew to destroy the helicopter. The helicopter pilots naturally questioned the orders to abandon their aircraft because they didn't recognize who was in charge on the ground. Beckwith personally went from one C-130 to the next shouting at the pilots not to take off on their own initiative until the assault force was loaded. Confusion among the dust, fire, and noise was only compounded by multiple commanders yelling orders. Whether or not the overall mission could have succeeded given six helicopters will remain a mystery. Some members of the investigation team gave it only a 60 to 70 percent chance of success. Others who had been involved in the planning of the mission gave it much less. (Anno, Einspahr, 1988, pp. 10-15)

B. QUESTIONS FOR THE STUDENTS

1. Explain the principle of the unity of command and describe why a well-integrated and well-understood chain-of-command is essential to mission success and efficiency.

2. What elements of command and control were missing in the ad hoc Joint Task Force structure that was organized for this mission? What was the weak link in the chain of command.

3. How could the JCS CAS have been used to enhance training and readiness? What is the importance of an independent review group in evaluating an operational plan?

4. At what level or echelon should OPCON be vested?

5. What role does intelligence collection play in mission planning? At what level should a J-2 staff element be responsible for collection, analysis, and collation of data?

6. What is the balance between the need to maintain OPSEC and effective communications? How does compartmentation of information aid or hinder the planners of an operation?

VII. CASE STUDY NUMBER TWO

A. THE GRENADA INVASION - OPERATION URGENT FURY

1. Introduction

On 25 October 1983, forces of the U.S. military invaded the country of Grenada. This decision was made on the basis of several factors. The first was that on 19 October, the government of Grenada collapsed, and members of a radical group of leftist rivals executed the country's prime minister. A second factor was the fear of another hostage crisis. There were thought to be over 800 American students at Grenada's medical school, and the president and his advisors feared that the new revolutionary regime would hold them hostage. One additional factor was that the Reagan administration also feared that Grenada would move into a Soviet bloc arena, specifically with Cuba. (Anno, Einspahr, 1988, pg. 36)

To invade Grenada, the military operation called for the island to be assaulted by two separate forces. The Marines were tasked with the northern half of the island and Army Rangers the southern half. Approximately 1500 troops were committed to the southern half, focusing on an airstrip at Point Salines. To the north, 400 Marines would take over the airport located at Pearls. Prior to the action at these locations, Navy SEALS would be inserted near St. Georges to secure the safety of Grenada's governor and to capture the government's radio station. (Anno, Einspahr, 1988, pg. 37)

In total, the invading force was to number about 1900 men with an anticipated number close to 5000 over the next few days. Assistance from neighboring islands called for 300 additional troops. The resistance expected from Grenada ranged from as few as 2000 up to 7200 fighters. In three days, the main objectives were achieved, and 599 Americans and 80 foreign nationals were rescued from Grenada. Eventually, U.S. forces were able to re-establish a representative form of government on the island of Grenada. (Anno, Einspahr, 1988, pg. 37)

The decision to invade Grenada began only about one week prior to the actual invasion. Military plans were finalized only 72 hours before the action began. Naval forces were either put to sea or re-directed to positions off the coast of the island of Grenada. Army Rangers and other forces assembled at both Fort Bragg, North Carolina, and Fort Stewart, Georgia. The president placed full operational control of the mission in the hands of the JCS. The JCS had a free hand in both planning and execution. The entire operation was meant to be a military show without any political interference from the White House. President Reagan did not want another Iranian desert disaster. (Gabriel, 1985, pg. 151)

2. Background

The Reagan administration came into power believing that the U.S. had lost its credibility. This was based on a number of factors. First, the Reagan administration believed that the world no longer thought the U.S. would or could respond to a military challenge. This may have been based on the U.S.'s dismal failure in Iran or the lack of U.S. response to the Soviet invasion of Afghanistan. This perception lead to a belief that the Soviets might further create challenges to

the U.S. The need to re-establish U.S. credibility is postulated to have been a major factor in the decision to invade Grenada. (Gabriel, 1985, pg. 150)

Second, was the Reagan administration's concern over a 12,000 foot runway being built by Cuban workers with British technology. The White House was certain that the new revolutionary regime would make the runway accessible to both Cuban and Soviet military aircraft. Finally, the Reagan administration viewed what was happening in El Salvador as a Soviet provocation, and the opportunity for the U.S. to "stand-tall" was going to be in Grenada. (Gabriel, 1985, pg. 151)

Overall responsibility for the success of the invasion rested with the Chairman, JCS, General John Vessey. The president's action seemed rooted in his belief that the Iran raid would have succeeded had it been left solely to the military. By placing the invasion of Grenada in the JCS's arena, President Reagan did two things. First, he clearly affirmed his trust and confidence in the military's ability to get the job done. Secondly, if things went horribly wrong -- as they did in Iran-- then the JCS could be held fully to blame and the Reagan administration would be politically "off-the-hook." (Gabriel, 1985, pg. 151) If things worked well, then the president could obviously reap the benefits.

3. The Mission

The invasion plan called for a number of special forces actions prior to the actual invasion of Grenada by the main force. The main force was made up of Marines, Rangers, and members of the 82nd Airborne Division. Supporting the invasion, but not under U.S. OPCON, were elements of Barbados and Jamaican police and what was known collectively as the Caribbean Peacekeeping Force. The

JTF organization was supported by Navy and Air Force elements as well. The U.S.S. Independence Battle Group, elements of the Military Airlift Command (MAC), Tactical Air Command (TAC), Strategic Air Command (SAC), and the Readiness Command (READCOM) also supported the JTF. (Anno, Einspahr, 1988, pg. 39)

The mission's principal objective was to overwhelm the island's defense force in a quick, massive, "surgical" action designed to minimize loss of life (Gabriel, 1985, pg. 151). The main military objectives were to: rescue the students at the medical school, evacuate the governor and other foreign nationals, and stabilize the internal situation by capturing the new Grenadian leadership (Metcalf, 1986, pg. 281). In effect, the plan was to take over the island and install a new regime more compatible with the U.S.'s interests (Gabriel, 1985, pg. 151).

There were a total of seven special operations missions to be conducted prior to the main invasion. Two of these were assigned to the counter-terrorist/hostage-rescue Delta Force. The night before the invasion, this force was to parachute into Point Salines and secure the airstrip. At dawn, C-130 aircraft would land at this airport and unload the Ranger assault force. Additionally, the Delta Force was assigned the task of assaulting Richmond Prison and rescuing political prisoners held there. These prisoners were considered vulnerable to being held hostage. (Gabriel, 1985, pg. 152)

The Navy's SEAL team comprised of 22 men was responsible for rescuing and evacuating the governor from his estate. The SEAL team would be inserted by helicopter and evacuate the governor to the U.S.S. Guam. Additional SEAL teams

were to reconnoiter the Marine landing zone at Pearls airport, seize the radio transmitting station, and take control of the island's main diesel generating plant. (Gabriel, 1985, pg. 152)

The main force was to deliver the major blow to Grenada's defenses. These forces included Rangers deploying to the Point Salines airport as the initial strike force and as the means to permit reinforcement by the 82nd Airborne division. The other action was by Marines deployed by helicopter assault launched from U.S.S. Guam. The Marines were to secure the airport at Pearls. The source of greatest military force was to be provided by the 82nd Airborne division, which could deploy 3000 men by C-141 aircraft to Point Salines. Another brigade size force was staged at Fort Bragg in ready reserve. (Gabriel, 1985, pg. 153)

The invasion plan called for committing two Ranger battalions of about 800 men each. A strike force of about 600 men would be formed at Point Salines airport. Meanwhile, the Marines would put ashore a battalion landing team -- about 800 men including five to seven tanks. With the 150 or so men in the special forces teams and the main force, the "plan" was to put 5,000 men in Grenada. With reinforcements, the invasion force grew to 8,000 (Gabriel, 1985, pg. 154). All tolled, the U.S. and assisting neighbors only encountered approximately 1,200 Grenadians, 780 Cubans, 49 Soviets, 24 North Koreans, 16 East Germans, 14 Bulgarians, and 4 Libyans (Anno, Einspahr, 1988, pg. 37).

4. Command Relationships

To carry out the invasion of Grenada, JTF 120 was established. Commander in Chief, U.S. Atlantic Command (USCINCLANT), Admiral Wesley McDonald, with guidance from the JCS, was responsible for expanding the plan. Vice Admiral Joseph Metcalf III, USN, was placed in command of JTF 120 with Major General Norman Schwartzkoph, USA, as his deputy. The Grenada invasion was to be a joint operation with forces from all four services.

The JTF was augmented by a staff selected from Metcalf's command organization as Commander, Second Fleet. Added to the fifteen officers from the Second Fleet Staff were augmentees from the Air Force, Army, CIA, and the State Department. Liaison officers from the Rangers and 82nd Airborne also were provided. Under normal conditions, the JTF 120 staff would have had as many as 88 people assigned, but with the short fuzed nature of the operation, Metcalf improvised.

Directly reporting to Metcalf as CJTF 120 were four component task forces -- USAF, USA Ranger, USA 82nd Airborne, and USN Amphibious Readiness Group (ARG). In direct support of JTF 120 was the Caribbean Peacekeeping Force and the Navy's U.S.S. Independence Battle Group (Metcalf, 1986, pg. 281). The Marine Landing Force was directly subordinate to the ARG Task Force Commander. Command and control of all special operations missions was vested in the Joint Special Operations Command (JSOC). The JSOC was created following the Iranian rescue mission to provide integration of mixed special force units. This command is a special planning group outside normal command channels. It has

total authority over controlling the resources assigned to it. In Grenada, JSOC was responsible for all special operations missions, including Delta Force, SEAL teams, and all the rescue and seize objectives. The initial Ranger deployment and the aircraft used were controlled by JSOC. The C2 staff of JSOC used a C-130 airborne command post over Grenada during the operation. (Gabriel, 1985, pg. 153)

Major General Schwarzkopf was initially assigned to Metcalf's staff as a liaison officer, but early in the planning process and on his own authority, Metcalf appointed him deputy. Each day before and during the invasion, Metcalf and his component commanders met and discussed the mission as it was developing. In addition to the mission statement issued from higher authority, JTF 120 was given the following ROE (Metcalf, 1986, pg. 281):

- Use force and weapons as may be essential to the accomplishment of the mission.

- Minimize the disruptive influence of military operations on the local economy.

- Execute initial tasks with minimum damage and casualties.

Vice Admiral Metcalf's flagship as Commander, Second Fleet, was the U.S.S. Mount Whitney, the newest command and control platform in the Navy's inventory. The communications suite was considered the most capable and state-of-the-art. However, when Metcalf deployed to Grenada, he was stationed aboard U.S.S. Guam, one of the Navy's oldest amphibious ships. The communications suite aboard this ship was limited and had not been upgraded commensurate with the communication requirements necessary to support a JTF commander (Metcalf, 1986,

pg. 293) Furthermore, this class of ship had never been designed as a flagship of this level.

The JCS planned from the beginning to assign forces according to mission. Forces were assigned tasks that closely paralleled service training. The JCS assignment of tasks to the Army and Marines was intended to utilize their specialized, individual training. The JCS made a deliberate planning decision to keep the units separate. This was meant to keep the Marines and Army from "shooting at one another." (Metcalf, 1986, pg. 283)

5. Command, Control and Communications

In executing the mission, the C2 structure was simplistic, designed to employ forces in a way consistent with their specialties and training. To allow forces to fight the way they were trained, two ground commanders were used, one for the Marines in the north, and another for the Army forces in the south. The principle of unity of command notwithstanding, this was rationalized as necessary to ensure that differences in operating styles would not jeopardize the mission.

To improve unity of effort, each subordinate commander met with Vice Admiral Metcalf on a daily basis -- either aboard the flagship, or when he came ashore. These meetings produced a hard copy report which was sent to USCINCLANT and to JCS outlining the next day's military plan. A significant portion of Metcalf's staff, as part of his battle organization, was committed to communicating up the chain of command to the NCA. This group, under the direction of a navy captain, was charged y Metcalf with submitting two situation reports each hour. The staff operations officer, another navy captain with alot of

73

experience with the USCINCLANT staff, maintained a secure link with USCINCLANT during the combat operations.

Admiral Metcalf's rational for this was that he believed the CINC and his staff should always hear the same voice over the circuit, a voice they knew and could relate to. The object was to create the impression that Metcalf was in control and knew what was happening. The system of situation reports and the "command voice" were the primary reasons, he felt, that higher authority permitted him to retain control over the military action at the local (Grenada) level. In a lessons learned article, Metcalf wrote:

> In this day of instant communications from and to anywhere in the world, combined with the high status involved, the local command has an obligation to communicate information up if he expects to retain control. Higher command authority must always have information, or they will remove control from the local commander. (Metcalf, 1986, pg. 285)

Intelligence support was provided by various sources throughout all phases of the operation. According to initial JCS estimates on the resistance expected on Grenada, the U.S. could look to find between 700 and 1100 Cuban soldiers augmented by another 1500 from the People's Revolutionary Army (Grenadian Army) and 2000 to 5000 Grenadian territorial militia (Gabriel, 1985, pg. 154). Against this number, the JCS plan called for only 5000 U.S. troops in the initial assault. Counting two reinforcing brigades of the 82nd Airborne, total U.S. forces would only number about 8000 men. Army doctrine states that forces attacking a deployed defense typically require a three-to-one advantage to ensure success. The JCS did not take these estimates seriously, nor did they expect the Grenadian and Cuban forces to fight well. Additionally, these forces were essentially unarmed, and

the weapons they did have were relatively unsophisticated. Or so the JCS convinced themselves and the president. (Gabriel, 1985, pg. 155)

Intelligence sources were not able to pinpoint the exact location of all of the American students, and U.S. forces had not received information that there were two other groups of students on the island. Army forces carried tourist maps into the battle with improvised grid co-ordination systems. No terrain contours were drawn on these maps, and many were hand drawn and reproduced the night before the invasion. The Marines were equipped with old British maps. Both sets of maps had different grid systems for locating points on the ground. One consequence of the lack of maps was the inadvertent destruction of a mental hospital located near an enemy defensive position at Fort Frederic. The hospital was not shown on maps used by the Navy's air strike force. In another case, an air strike called in by the Marines hit an Army command post because the grid co-ordinates did not match. (Gabriel, 1985, pg. 178)

Communications support, as with the military organization for the operation, was a "come-as-you-are" proposition. Unlike the combat forces who were organized to fight independently of one another, communications was to have been the link that tied together the operation of the four U.S. military services.

Heavy use and reliance was placed on satellite communications (SATCOM). The operation had several satellite channels assigned to it. In many cases, satellite communications were available at a company level from man-pack radio terminals. High frequency and other tactical radio units were used in the invasion and used as back-up to the satellite paths. Aboard the flagship, U.S.S.

Guam, Vice Admiral Metcalf faced communication equipment shortages and limitations in that he could only access one secure voice channel -- which became the task force common circuit. (Metcalf, 1986, pg. 295)

Similar communication shortages existed in the distribution of intelligence related information. National assets and human intelligence networks were not directed toward collection efforts in Grenada because it was considered only a third world country. Furthermore, when adequate maps had been procured from the Defense Mapping Agency, they were mailed rather than transmitted via intelligence electronic means. Satellite imagery of defense strongholds was not provided to the field commanders on the ground, but remained in Washington, D.C., or in Norfolk, VA. (Anno, Einspahr, 1988, pp. 42-43)

Shortages were not the only communications problem found in Grenada; interoperability was another. For example, uncoordinated use of radio frequencies prevented radio communications between Marines in the north and Rangers in the south. As such, interservice communications was prevented, except through off shore relay stations, and, this kept Marine commanders unaware for too long that Rangers were pinned down without adequate armor (Anno, Einspahr, 1988, pg. 43). Commenting overall on the issue of interoperability, Admiral Metcalf wrote:

> In Grenada, we did not have interoperability with the Army and the Air Force, even though we had been assured at the outset we did. So consequently, we could not make the installed communications work. (Metcalf, 1986, pg. 295)

Several factors have been cited as the cause of the communications problems confronted in Grenada. Among them were insufficient planning for the operation, lack of training, inadequate procedures, maldeployment of communications security

(COMSEC) keying material for the different radio networks and a lack of preparation through exercise realism. (Anno, Einspahr, 1988, pg. 44)

While the details of most of the above noted causes are not available in unclassified sources, the issue of exercise realism has been clearly and perceptively explained by Admiral Metcalf following the invasion:

> We do conduct communications exercises in the Navy, but in these exercises, we give our communicators about 12 months preparation. Therefore, it should not be surprising that when the exercise starts, communications work... The communicators may not be so much at fault. Our failure in preparatory exercises to uncover and anticipate problems similar to those we faced in Grenada may have been because our exercises are over prepared. Given enough time, anyone can make communications work. And if the objective of an exercise is to make things work, then the conduct of the exercise will be optimized to show that the exercise will work. Unfortunately, in a crisis situation -- a "come-as-you-are" situation -- it did not work. (Metcalf, 1986, pg. 295)

6. Operation Urgent Fury - A Political Success; A Military Lesson

The element of surprise was considered essential to the entire invasion. The success of the invasion depended heavily on the ability to quickly seize and hold the airport at Point Salines until reinforcements arrived (Gabriel, 1985, pg. 177). Days before the invasion, the Cubans undertook significant actions to improve basic defenses on the island, particularly at the Point Salines airport. Cuban forces constructed bunkers all around the airfield and dug in. Approximately 35 to 40 soldiers of the Delta team were parachuted into Point Salines in darkness, and when the Cuban garrison spotted them, the element of surprise was gone (Gabriel, 1985, pg. 156). Delta Force personnel were surrounded on three sides by Cuban forces and quickly began to fight for their lives. Twenty-two men were killed before the Rangers landed and rescued them at dawn (Gabriel, 1985, pg. 157). Defenders were

now fully alerted to the invasion, and the alarm was sounded throughout the island four hours before the main forces arrived (Gabriel, 1985, pg. 157).

The second Delta team, launched at dawn of the first day, was to assault Richmond Hill Prison and rescue the political prisoners held there. Richmond Prison is located atop a steep, sixty-degree promontory behind the town of St. Georges. The prison located on this elevated mountain point offers no place for a helicopter assault force to land. Three of the four sides cannot be approached by foot except through dense jungle. The fourth side is accessible through a narrow roadway bordered by tall trees. Across the valley and higher up is Fort Frederic. It was from here that a large Grenadian garrison was housed and defense forces were directed. The helicopter assault force was met with heavy armed resistance, and many helicopters crashed on the valley floor as a result. The Delta team's assault on Richmond Prison failed.

SEAL teams to the north were facing challenges of their own. Two four-man teams were dropped by C-130 aircraft in the sea near the end of Pearls runway. They were to reconnoiter the airport to determine what fortifications there might be. The marines intended to conduct a heliborne assault against the airport and had to know the nature and strength of its defenses. Although the method of bringing them in remains classified, it seems that the SEAL teams were to low altitude parachute from the C-130s into the water. This technique uses a drogue parachute to pull the men and equipment from the back of a low flying C-130 aircraft as it skims the water. What happened is that one four-man team deploying from the aircraft in its rubber whale boat was knocked unconscious by the impact with the water.

78

Thrown from the boat as it hit the water, and weighed down with weapons and equipment, the men were dragged under and drowned. The second team landed in the water safely, but somehow lost its engine, and the current dragged the men out to sea. The Marines therefore had no advance team in place to secure the area prior to their landing. A third SEAL team met heavily reinforced defenses at the radio transmitter tower and was forced to retreat, failing at its mission. A fourth SEAL team inserted at the governor's mansion quickly found itself surrounded and trapped with the governor. It must be emphasized here that JSOC had overall operational responsibility for the execution of these special missions outside the JTF 120 organization.

The initial Ranger deployment to Point Salines airport was rigged for the aircraft to land, but because the airport was not secured against enemy fire, the plan was changed to a parachute assault. As a result, much of the heavy medical supplies, communication equipment, and anti-tank weaponry could not be airdropped (Gabriel, 1985, pg. 164). The assault did not go well at all. Command elements of Rangers found themselves separated from their battalions as the C-130s staggered in under enemy fire. Aircraft were only committing to the drop zone one at a time, and this lead to confusion and delay. This piecemeal deployment was attributed to airborne forces having to re-rig enroute. Gradually, Cuban forces withdrew as the Rangers took up offensive positions, but reinforcements did not arrive as originally planned until almost five hours after the first assault. (Gabriel, 1985, pg. 166)

Meanwhile, the Marines put ashore without resistance and were in the process of unloading reinforcement tanks and vehicles when the command came to

redeploy across the island to support Army elements. Between helicopter transport and amphibious means, the Marines responded with flexibility and speed, but tanks found themselves in exposed positions near the governor's mansion without infantry support. Over the course of the day, Marines were also in a position to aid in the attack on Richmond Hill Prison (Gabriel, 1985, pg. 167). By listening to Cuban radio broadcasts, it was apparent that the resistance was being controlled and directed from Ft. Frederic, which was the nerve center for Cuban and Grenadian forces. Assisted by naval aviation units from the carrier battle group, Ft. Frederic was eventually destroyed, and the overall resistance effort seemed to lose momentum (Anno, Einspahr, 1988, pg. 37).

The Rangers reached students located at one campus on the first day of the invasion but had no idea that there were students located elsewhere on the island. One group was located at a campus only four miles from the airport, and another group was located in a housing complex further to the north. Although it took another two days to rescue these students, no threats were made against them by Cubans or Grenadians. It was not until U.S. forces arrived that the students felt any real danger because it was then that a battle between U.S. forces and the Grenadians could have forced the enemy through its defensive lines through the campus itself. A combined assault force was used to isolate the main body of the defenders, and they eventually either ran away or surrendered.

It was on the third day of the invasion that U.S. forces had finally gained the advantage. The remaining enemy strongholds were attacked by Rangers and paratroopers from the 82nd. Navy A-7 attack aircraft provided necessary air cover.

Back at Point Salines, forces from the 82nd had only moved about four miles north. It was then that the Army units came into contact with Marine forces, and a friendly-on-friendly engagement nearly resulted (Gabriel, 1985, pg. 173). By the end of the third day, Operation Urgent Fury had achieved all military objectives, safely evacuated the students and other "political prisoners," and came to an end (Gabriel, 1985, pg. 173).

B. QUESTIONS FOR THE STUDENTS

1. Explain the principle of unity of command and how different operating procedures can cause disunity between different services.

2. Explain how Vice Admiral Metcalf applied the concept of "span of control" in dealing with the chain of command. What role did delegation of authority play in his command structure?

3. What role does intelligence distribution play in a military operation? Do tactical commanders need the capability to analyze and correlate information in near real-time? If so, why?

4. How can communicators improve interoperability and integration of forces in a situation where "come as you are" is faced? Describe types of exercises that can be used to enhance realism in a peacetime environment.

5. Were the rules of engagement clear and unambiguous enough to perform the mission? How does ROE form the direction for the accomplishment of a mission?

6. How did use of the JTF apparatus aid in planning a mission on short notice. Is the JTF command structure sufficient in handling a crisis of the magnitude experienced in Grenada?

7. How does duplicity of effort such as special operations under a separate command structure help or hinder an operation?

VIII. CASE STUDY NUMBER THREE

A. THE RAID ON LIBYA - OPERATION EL DORADO CANYON

1. Introduction

On the evening of 15 April 1986, the U.S. launched a series of military air strikes against ground targets inside Libya. This action was justified by President Reagan to the public as a matter of U.S. self defense against Libya's state-sponsored terrorism. In part, he stated that "self defense is not only our right, it is our duty." (Anno, Einspahr, 1988, pg. 49)

Initial planning for operations against Libya began immediately following terrorist attacks against Rome and Vienna airports in late December 1985. The use of force was specifically provoked by Libya's directed terrorist bombing of a West Berlin discotheque 7 April 1986, in which one American was killed and 200 innocent people were injured (Anno, Einspahr, 1988, pg. 49). The air strike against Libya was designed specifically to hit Libya's known terrorist activity centers. Initially, five targets were selected because of their direct connection to terrorist elements within Libya. These targets ranged from military airfields where Libya was expected to launch air defense to terrorist command posts and training sites. The final targets were chosen at a National Security Council level by a close circle of advisors to the president (Anno, Einspahr, 1988, pg. 49).

In response to national tasking, U.S. naval forces operated in the vicinity of Libya between January and April 1986. The operations were divided into two distinct phases. Phase One was conducted between the months of January and March and involved freedom of navigation operations conducted ostensibly to challenge illegal Libyan claims to sovereignty over water and airspace in the Gulf of Sidra (CNO, 1987, pg. 37). Phase Two, conducted in April, was designed with the main objective of inflicting damage to terrorist facilities and military installations that supported Libyan subversive activities. During this phase, coordinated USN and USAF air strikes were conducted against the targets selected by the NSC.

2. Background

During the middle years of the Reagan administration, international terrorism was making front page headlines almost daily. Public interest in Libya's state-sponsored terrorist activities reached a peak when the airports in Rome and Vienna were bombed, causing numerous casualties and injuries. International terrorist attacks were dramatically increasing, and the time for the U.S. to provide incentives and reasons for altering this criminal behavior had finally come.

Terrorist organizations in Libya were gaining momentum. They were gathering new weapons and explosives, establishing sophisticated training programs, stepping up recruitment, and regrouping for new rounds of premeditated violence. Terrorism was evolving so quickly that the U.S. was facing some unique challenges. Groups of terrorists were increasing their co-ordination and range of tactics, as well as openly committing to eliminate U.S. influence in the Middle East.

For the most part, U.S. public opinion backed any action that was meant to strike at the heart of Libya's ability to export terrorism. When the West Berlin discotheque was bombed by Libyan sponsored terrorists, the cry for self-defense was heard through the West. President Reagan invoked Article 51 of the United Nations Charter to explain the purpose of the mission to strike Libya. The timing of the attack was such that while some of the strike aircraft were still in the air, the President was able to address the U.S. public and much of the world.

In the month previous to the raid against Libya, during the freedom of navigation operations in the Gulf of Sidra, U.S. naval forces were attacked by Libyan military forces. In an area just south of Khadafi's "line-of-death," Libyan surface to air missiles (SAM) were launched against U.S. aircraft operating in traditionally international airspace. Naval forces responded by attacking the SAM sites at Sirte and Libyan patrol boats threatening U.S. naval forces. (CNO, 1987, pg. 44)

3. The Mission

Five targets which were initially selected included: the Aziziyah barracks described as C2 headquarters for Libyan terrorists; Tripoli's military facility and main airport; the Sidi Bilal base which was a terrorist training camp; the Jamahiriyah military barracks in Benghazi which was a terrorist command post; and Benina air base. All except one of these targets were chosen because of their direct connection to terrorist activity. The exception was Benina airfield which was a military installation from which Libyan fighter aircraft were staged. (Anno, Einspahr, 1988, pg. 50)

All five targets were planned to be hit by U.S. forces simultaneously. Navy resources were not in a position to accomplish the mission by themselves. Since a precision night attack was planned, there were only two types of aircraft that could perform the strike mission: Navy A-6 and Air Force F-111 aircraft.

Although there were two aircraft carriers in the Mediterranean at the time initial planning for the raid began, they were not equipped with sufficient A-6 aircraft required (32 total) to successfully hit all targets simultaneously. The nearest F-111 aircraft were based in the United Kingdom (UK), and their use was going to significantly affect the scope and complexity of the mission. French authorities refused airspace authorization for the F-111s to fly over France which added both distance and time to the flight to Tripoli. (Anno, Einspahr, 1988, pg. 51)

The size of the strike force was immense. Approximately 100 aircraft were going to be committed to the strike mission. The Air Force was to provide 28 tankers, five electronic counter measure (ECM) configured F-111 Raven aircraft, and 24 F-111 strike aircraft. The Navy was to provide four E-2C Hawkeye airborne C2 and warning aircraft, 18 F-14 Tomcat Fighters for combat air patrol, 12 A-7E and F/A-18 electronic warfare (EW) aircraft, and 14 A-6E strike aircraft. (Anno, Einspahr, 1988, pg. 51)

In addition to the strike and direct support aircraft, helicopters and several other types of aircraft were airborne in the vicinity of the carrier battle groups positioned 200 miles offshore to provide search and rescue and other miscellaneous operations. The two carrier battle groups, U.S.S. America and U.S.S. Coral Sea,

were comprised of the standard mix of cruisers (AEGIS), destroyers, frigates, and two submarines in direct support.

Two days prior to the actual raid, the task force conducted a practice strike and joint C3 exercise at sea with USAF units. Although joint in nature, the actual execution of the strike was operationally and geographically split between the Air Force and Navy. Navy A-6 strike aircraft were assigned the target in the Benghazi area, and the Air Force F-111s were to hit the other three targets in the vicinity of Tripoli (Anno, Einspahr, 1988, pg. 52). A preemptive strike was planned against the Benina military airfield by a combination of USAF and USN attack aircraft to prevent Libyan interceptors from taking off and attacking the incoming U.S. bombing raid (Anno, Einspahr, 19888, pg. 5U).

The first aircraft to launch were the USAF tankers followed closely by the F/EF-111s. Because of the diplomatic actions of France, the flight to Tripoli was an additional 1300 nautical miles (or six to seven flight hours.) Four refuelings were required during their transit. The Air Force aircraft would be integrated into the Navy's airborne force as directed by an Air Force officer aboard a KC-10 tanker which had been modified to act as an airborne command coordination platform. (Anno, Einspahr, 1988, pg. 52)

Actual combat operations commenced at 0200 local time and lasted less than twelve minutes. Planning, coordination, and control efforts which had started months earlier resulted in over sixty tons of ordnance being dropped on targets in Libya. Success of the mission depended heavily on the element of surprise. The

raid on Libya involved (to some degree) more aircraft and combat ships than what the British had deployed against the Falklands. (Anno, Einspahr, 1988, pg. 52)

4. Command Relationships

Commander in Chief, Europe Command (USCINCEUR), through his naval component commander CINCUSNAVEUR, designated Commander, Sixth Fleet (COMSIXTHFLT), Vice Admiral Frank Kelso, as Commander, Central Mediterranean Operations (COMCENTMEDOPS) with a direct link between the two commands (CNO, 1987, pg. 7). In the mission planning, the chairman of the JCS (CJCS), Admiral William Crowe, emphasized noninterference from higher authority by making every effort to provide COMCENTMEDOPS, the on-scene commander, with full authority to make any necessary decisions. (Anno, Einsphar, 1988, pg. 53)

Consistent with the CJCS philosophy, Vice Admiral Kelso, designated as the Joint Commander, was given complete C2 of the operation. He was assigned the mission and was provided a time line for the raid. As on-scene commander, he was given complete authority and flexibility to deal with any varying contingency in the strike environment (Anno, Einspahr, 1988, pg. 53). Vice Admiral Kelso also had authority to abort the mission up to ten minutes prior to execution due to weather or other operational considerations. Given the time line and the requisite authority, COMCENTMEDOPS simply had to bring it all together.

The concept of noninterference with command and control seems to have cascaded down the entire chain of command in varying degrees. A formal diagram of the C2 arrangements might seem complex -- reflecting operational control lines,

tactical control responsibilities, vertical/lateral coordination channels, reporting chains, etc. However, in actual practice, normal and existing operational and administrative channels through EUCOM were used for the planning and execution of this operation.

Each service essentially did its own weapons system planning for the operational area. Nearly all detailed staff planning was delegated to unit level. Initial warning orders for a possible strike against Libya were issued to various task organizations in late December 1985. The nature of contingency tasking severely limited higher headquarters tasking and assistance (Anno, Einspahr, 1988, pg. 54). Headquarters staff officers who would not be flying the mission did not involve themselves with making decisions rightfully made by those flying the mission (Anno, Einspahr, 1988, pg. 54). In addition, there was an substantial flow of inquiries and guidance directly to the task units.

Exchange of liaison officers and coordinated planning by USAF/USN organizations facilitated in eliminating some of the interoperability problems (e.g. Navy and Air Force vernacular, terminology and procedures) that plagued earlier multi-service operations. The Air Force liaison officer was an experienced pilot and became an integral part of the Navy's battle staff. The Navy's exchange officer was a similarly qualified pilot who became part of the command structure aboard the KC-10 command aircraft. (Anno, Einspahr, 1988, pg. 54)

The division of responsibility for geographical areas of the Libya raid was done to simplify the C2 of the operational aspects of the strike. The modified KC-10 tanker controlled USAF assets and the carrier, U.S.S. America, controlled USN

assets. Airborne E-2C Hawkeye aircraft provided early warning, air control vectoring and combat air patrol operations.

The need for an elaborate, up-channel, status reporting to EUCOM was eliminated due to the anticipated short duration of the raid. Timely reporting of preliminary results in support of President Reagan's simultaneous national television announcement was considered absolutely essential. The up-channel reporting was handled informally and verbally using existing established satellite communication systems (SATCOM). (Anno, Einspahr, 1988, pg. 56)

Operational control and tactical control of El Dorado Canyon were conducted from the Tactical Flag Command Center (TFCC) aboard U.S.S. America. The Battle Group Commander and COMCENTMEDOPS were co-located aboard the carrier. All in all, the success of the mission was considered to be the result of establishing and maintaining a simple command structure. A flexible and effectively integrated battle force command organization was credited in part for eliminating or reducing interoperability lessons that were learned in Grenada. (Anno. Einspahr, 1988, pg. 65)

5. Command, Control and Communications

National signals intelligence (SIGINT) and satellite photo imagery assets provided direct support to mission planners. The Defense Intelligence Agency and NSA were formally tasked with providing intelligence support for strike planning. In-theater operations intelligence (OPINTEL) and organic SIGINT assets were integrated into the joint command structure to assist in providing real-time indications and warning of Libyan intentions and posture (CNO, 1987, pg. 40).

American intelligence resources are said to have given President Reagan the impetus for the attack. Intelligence sources intercepted a message from Khadafi ordering an attack on Americans "to cause maximum and indiscriminate casualties." (Anno, Einspahr, 1988, pg. 56)

Probably one of the single most important factors contributing to the mission accomplishment was the clear and unambiguous ROE provided to Kelso from higher authority. Face to face discussions between Kelso and the SECDEF as well as approval and delegation of sufficient and timely ROE to individual commanders and flight crews was meant to ensure that they knew and understood exactly what actions could and could not be taken. (CNO, 1987, pg. 7)

The array of communications utilized for the raid on Libya evolved throughout the planning phase. To maintain the surprise factor, secure communications capability on all tactical circuits was considered essential. During the initial stages of planning, existing communications facilities were the principal means of communication. During the combat phase of the raid, airborne communications systems became the primary means of maintaining command and control (Anno, Einsphar, 1988, pg. 57). A SATCOM terminal was installed in a KC-10 to contact the joint commander (located on the carrier U.S.S. America) as well as other higher headquarters as necessary.

Satellite communication systems supported C2 at all levels including links to Washington, EUCOM, USAFE, Sixth Fleet, and the USAF F-111 Wing. Two SATCOM nets were used to link commanders to higher headquarters. A SATCOM terminal was strapped to the KC-10 command aircraft to support its airborne C2

function. In fact, it served as a primary means of communication between Kelso and the USAF forces commander during the actual combat phase of the operation.

The rationale used for geographically separating the Air Force and the Navy strike forces was due to communication system incompatibilities. Air Force F-111s have a quick frequency hopping UHF radio, but neither the USAF tankers or any of the Navy aircraft had this capability. This equipment was installed aboard the tankers prior to the raid but was not readily available to the Navy aircraft. (Anno, Einsphar, 1988, pg. 59)

The operation was designed to be conducted in complete radio silence. All four refuelings and the combat strike were performed without communicating. There was some initial concern among the Air Force pilots because no code word was established to confirm the go-ahead for the mission. Only an abort code was provided, and there were so many things that could have gone wrong or change in the long transit to Tripoli. In fact, a secure call from Headquarters, Strategic Air Command, in Omaha (tanker representative) to the UK was necessary to confirm the mission go-ahead. (Anno, Einsphar, pg. 56)

Navy and Air Force communications interfaces between the fighter aircraft and search and rescue (SAR) aircraft were not worked out in advance by mission planners. Specific procedures for contacting and coordinating Navy SAR efforts had not been spelled out in any detail, and furthermore, had not been practiced in the joint C2 exercise. (Anno, Einsphar, 1988, pg. 60)

6. Strike Operations

To minimize collateral damage and aircraft loss/aircrew capture, stringent go/no-go criteria were established. Aircraft without full system capability for navigation, weapons, radar homing and warning, and radar were required to abort their mission. Aircraft from U.S.S. America were assigned strike responsibility for the Benghazi barracks. Additional strike aircraft from U.S.S. America were deployed to provide support for the strike against Benina. Remaining America aircraft supported USAF air strikes in the Tripoli area. Air Force F-111 aircraft were assigned Azizyah barracks, Sidi Bilal complex, and the Tripoli airfield. Some Navy and Air Force aircraft both suffered from equipment or weapons malfunctions and had to abort their mission while airborne prior to the strike. (CNO, 1987, pp. 33-34)

The timing of the strike was a critical element to the raid. In fact, one of the F-111s was delayed in its final refueling prior to rendezvous, and because it was out of sequence with the rest of the strike force, it aborted (Anno, Einsphar, 1988, pg. 56). The strike plan was designed to be straightforward and simple to minimize the complexity of coordination among strike elements. Route and altitude deconfliction was of primary concern to the air space control problem (CNO, 1987, pg. 36).

Ingress and egress of the strike aircraft was designed to be at 500 feet, below the Libyan radar horizon. Single-aircraft ingress and egress timing was meant to retain the element of surprise. The strikes were designed to have simultaneous attacks on target areas using the element of surprise and cover of darkness to assure

aircraft survivability (CNO, 1987, pg. 37). An integral part of the strike was support from electronic surveillance and electronic countermeasures aircraft to suppress enemy defense. Combat air patrol fighters were also airborne to provide defensive support of egressing aircraft.

By nearly all post-action accounts, the U.S. strike came as a complete tactical surprise to Libyan Air Defense Forces. Air defense units, although issued a general-alert warning in the days just prior to the raid, did not show any increased state of readiness. Furthermore, Libyan C3 was characterized as chaotic with U.S. jamming adding to confusion among higher echelon C2 efforts. Although numerous Libyan interceptor aircraft were available to launch against the U.S. strike force, none were. The reason for this remains unclear. (CNO, 1987, pg. 39)

Strike aircraft target acquisition was difficult because some of the targets were located within dense urban areas. Navigation systems aboard these aircraft could not fully cope with overland track timing and a lack of known reference points (CNO, 1987, pg. 45). Imagery inaccuracies also contributed to difficulties in target pinpointing efforts. Lack of low level flying proficiency among U.S. pilots was one of the principal causes for these difficulties (CNO, 1987, pg. 49).

There were other C2 difficulties that caused troubles during the egress. Tragically, an aircraft and its two crew members were lost during the combat. Limited communications caused problems linking up the strike aircraft with waiting tankers after exiting the combat zone. With one strike plane missing, it took the air armada over an hour trying to account for the missing aircraft. (Anno, Einsphar, 1988, pg. 60)

Finally, high frequency (HF) equipment located at Mildenhall, UK, was used to confirm the number of aircraft which had returned from the strike area (Anno, Einsphar, 1988, pg. 60). Coincidentally, the Navy SAR effort was severely hampered when trying to locate the missing F-111. In the final analysis, the full tanker force had been vulnerable to Libyan air defense aircraft which fortunately never launched.

B. QUESTIONS FOR THE STUDENTS

1. Explain the role of cross-familiarization between service standard operating procedures in the unification of services and interoperability.

2. How does having a clear and well understood set of rules of engagement enhance the delegation of authority to the lowest operational level?

3. What role does expanded intelligence distribution play in the planning phase of a military operation? How does the cross-flow of intelligence information between services aid in reducing inherent interoperability shortfalls among the services?

4. Explain how a quick reaction operation is affected by "jury-rigging" or re-configuring of communications resources. What is the impact of not having pre-established communications capability in joint contingency operations?

IX. CASE STUDY NUMBER FOUR

A. THE RESCUE OF THE S.S. MAYAGUEZ

1. Introduction

On 12 May 1975, the S.S. Mayaguez, an American Merchant Marine ship, was seized by Cambodian soldiers in an act of piracy. The S.S. Mayaguez was seized in international waters 60 miles off the coast of Cambodia as she was making way from Hong Kong to the port of Sattahip, Thailand. The attackers, using armed patrol boats, fired a rocket and machine guns across the bow of the merchant ship forcing it to stop. Once aboard, the Cambodian attackers ordered the vessel's captain to follow their patrol boats to the mainland port of Sihanoukville. Fortunately, the captain had time to radio his position and a mayday message to the vessel's owner (the Sealand Service Corporation) in Jakarta, Indonesia. The U.S. embassy there relayed the mayday to the National Military Command Center (NMCC) in Washington, D.C..(Gabriel, 1985, pg. 62)

Within only six hours of the S.S. Mayaguez capture, President Ford called together his closest advisors for a meeting of the National Security Council (NSC). He directed U.S. aircraft based at U Tapao, Thailand, to begin immediate search and reconnaissance missions to locate the ship. Following the NSC meeting, the White House issued a press release terming the seizure an act of piracy, holding the

government of Cambodia responsible, and suggesting military retaliation if the vessel and her crew were not released. (Guilmartin, 1990, pg. 3)

Thus were set in motion forces which resulted in a short yet significant military operation. In only 78 hours following the S.S. Mayaguez mayday, U.S. Air Force aircraft bombed, strafed, and sank Khmer patrol boats in the Gulf of Siam. The Marines invaded Cambodian territory, establishing a beachhead on the small island of Koh Tang located in the gulf. After a vicious fight with Khmer Rouge forces that only lasted approximately two days, the Marines withdrew. Other Marines recaptured the ship, boarding from a Navy frigate in the first such action since the 19th Century. Carrier-based Navy aircraft bombed targets on the Cambodian mainland in a harsh and dramatic display of punitive retaliation. Air Force helicopters transported the Marines to and from Koh Tang with support from additional Air Force firepower.

In mid-action, for unknown reasons, the Khmer Rouge released the crew of the S.S. Mayaguez, sending them out from the port of Kimpong Som in a fishing boat to a waiting Navy destroyer. Meanwhile, the Marines would continue to fight the Khmer Rouge entrenched on Koh Tang for another eight hours (Guilmartin, 1990, pg. 3). This incident has been symbolized as the last U.S. military act of the Vietnam war.

2. Background

At the time of the Mayaguez incident, little was known or postulated with regard to the new rulers of Cambodia -- the Khmer Rouge. Having only captured Phnom Penh less than one month earlier, the Khmer Rouge leadership was still

consolidating its power in Cambodia. Consequently, President Ford and his advisors had no real idea as to why the Cambodian rulers would take such a great risk just to embarrass the U.S.. It was postulated at the time that the S.S. Mayaguez may have been seized based on the initiative of some local commander. (Guilmartin, 1990, pg. 9)

The ghost of the U.S.S. Pueblo crisis haunted many military planners in Washington. In that incident, locally available U.S. air and naval forces were not deployed promptly against the North Korean attackers. As a consequence, the North Koreans were able to secure the vessel inport, remove the crew, and render military intervention ineffective. The brutal Korean exploitation of the U.S.S. Pueblo's captain and crew exacted a deep and lasting diplomatic price. The Ford administration drew the parallel explicitly. (Guilmartin, 1990, pg. 10)

The seizure of an unarmed merchant vessel was a different matter from that of a naval vessel, but the opportunity for effective military intervention was expected to diminish rapidly nonetheless. These considerations were sufficient to compel a swift operational military response. In the years since the Pueblo incident, advancements in communications technology made it possible for President Ford and his advisors to be kept informed on a near real-time basis as the situation developed in the Gulf of Siam. (Guilmartin, 1990, pg. 10)

Politically, the need for urgency was confined by the provisions of the War Powers Act of 1973. This act required presidential consultation with Congress before the initiation of armed conflict by U.S. forces and a written justification of the commitment within 48 hours. President Ford and his advisors were clearly

anxious to resolve matters before congressional politics interfered. The need for a quick resolution was to exert an overriding operational influence. (Guilmartin, 1990, pg. 10)

3. The Mission

President Ford and his key advisors decided on three overlapping military objectives: to rescue the ship and crew; to avoid the possibility of a hostage crisis; and to use U.S. forces for a demonstration aimed at bolstering American credibility abroad (which was particularly low in the aftermath of the fall of South Vietnam and the humiliation suffered from the evacuation of Saigon two weeks earlier). The central objective was to recover the ship and crew, and subsequent actions suggest that the president was prepared, if need be, to give priority to the avoidance of a hostage situation at the expense of the crew's welfare. (Guilmartin, 1990, pg. 12)

The seizure of S.S. Mayaguez came only two weeks after the evacuation of Saigon, and most all of the task-force elements used in that operation -- which had been conducted near the coast of Cambodia -- had returned to their normal duties. When the White House issued the order for the military to formulate its contingency plans for the rescue action, the Pentagon quickly realized that there were few resources in the area with which to execute any operation. Only two Navy ships were close enough to be of any use, and they were 24 hours from Koh Tang. The carrier, U.S.S. Coral Sea, was re-directed from her transit to Australia to make all speed for Cambodia while two combatants, U.S.S. Henry B. Wilson and U.S.S. Holt, were ordered to break off their exercises off the coast of the Philippines and proceed to Koh Tang. (Guilmartin, 1990, pg. 13)

Two squadrons of the 7th Air Force were deployed at U Tapao, 195 miles from Koh Tang. The closest ground forces were the 3rd Marine Amphibious Force (MAF) deployed in Okinawa, ten flight hours from Koh Tang. U Tapao would be the staging area for the operation, and the Air Force had Navy A-7s, HH-53 helicopters, AC-130 gunships, and reconnaissance aircraft available to support the mission. The 1100 combat Marines on Okinawa would have to be airlifted from there to U Tapao. (Gabriel, 1985, pg. 66)

The plan involved two different phases. The first was to airlift and insert a sufficiently large combat force of Marines aboard the S.S. Mayaguez to recapture it from the Cambodians (presumed to still be aboard). The second part of the plan was to transport via helicopter a Marine combat assault force to Koh Tang to seize and hold the island. Despite the simplicity of this plan, insufficient helicopters were available to do both of these operations simultaneously. There were not even enough helicopters to lift a sufficiently large combat force to subdue the island. Nevertheless, military commanders at U Tapao decided to execute the mission. (Gabriel, 1985, pg. 68)

The first proposal called for a Marine helicopter assault against the S.S. Mayaguez. Landing the helicopters aboard the container ship was not considered feasible, so the planners ordered ladders and rappeling gear for the Marines to use from hovering helicopters over the containers aboard the S.S. Mayaguez. Once on deck, the Marines would use ladders and special platforms to move from container to container until they had overcome the enemy. Fortunately, this plan, suicidal at best, was rejected by a review board.

A second plan, devised only hours before the assault was to begin, was significantly different. It called for helicopters to transfer a force of 48 Marines, six Navy explosives experts, and six civilian seamen from MSC to the U.S.S. Holt. The frigate, standing off from the merchant vessel by two miles, would then close the S.S. Mayaguez, pull alongside, and the Marines would storm aboard. Seconds prior to this assault, A-7s would drop riot-control gas aboard the merchant to disable and confuse the enemy. The Marines would assault wearing gas masks and clear the ship with hostile fire and hand-to-hand combat. (Gabriel, 1985, pg. 69)

Eleven available helicopters were to launch from U Tapao at the same time. Three of these HH-53 Jolly Green Giants would transport the Marines to the Navy frigate. The other eight would fly past the S.S. Mayaguez and land 180 Marines at Koh Tang. The island, only three miles long, has two slivers of beach which were to be used as landing zones (LZ.) The plan was to put two Marine contingents ashore, one at each beach opposite sides of a narrow land spit jutting out into the water. The first contingent, one reinforced platoon, would land on the western LZ while the other contingent of two platoons would land on the larger eastern LZ. A mortar section would provide fire support in the eastern LZ to the west. The helicopters would then return to U Tapao to refuel and take reinforcements back to Koh Tang. (Gabriel, 1985, pg. 70)

The round trip from Koh Tang to U Tapao would take at least four and a half hours, and the ability to move a sizeable reinforcement hinged on all eleven helicopters being available. The planners of this part of the operation made the assumption there would be clear weather and that no helicopters would be lost to

equipment malfunction, accidents or hostile fire. They consequently put the lives of 180 Marines in the balance. The Marine assault was to be supported by naval gunfire from the two Navy combatants and Air Force air strikes called in by the ground commander. Aircraft from the carrier would also provide air support later in the day. (Gabriel, 1985, pg. 70)

4. Command Relationships

As the senior commander in the area, the 7th Air Force (7AF) commander was assigned responsibility for the operation. This command had been combined with the U.S. Support Activity Group (USSAG) which was the last remnant of Military Advisory Command, Vietnam (MACV.) Headquarters for USSAG/7AF was based at Nakhom Phanom, Thailand. The USSAG/7AF commander was Lt. General John J. Burns, USAF, and in accordance with normal practice, his deputy was Army Major General I. A. Hunt, Jr. (Gilmartin, 1990, pg. 16). Operational command relationships extended upward through Commander in Chief, Pacific (CINCPAC), Admiral Noel Gayler, based at Pearl Harbor, to SECDEF James Schlesinger who would exercise control through the National Military Command Center (NMCC), to the President (Gilmartin, 1990, pg. 16).

Command of the ground operations fell to Marine Colonel John M. Johnson, who led a command group formed from the 3rd MAF (Gabriel, 1985, pg. 66). When the order came to deploy the Marines, they had been out in central Okinawa for two days on a training exercise. Within three hours of receiving the order, four of the battalion's infantry companies returned to their main base and prepared to stage at the Kadena airfield. By morning, all Marine forces had been

assembled at Kadena, loaded aboard a C-141, and deployed to Thailand. One hour later, Battalion Landing Team 2/9 followed. Within ten hours, the Marine assault force was in place at U Tapao ready for combat. (Gabriel, 1985, pg. 66)

As COMUSSAG, Burns reported operationally to CINCPAC, but as Commander 7AF (C7AF), he reported administratively to Headquarters, Pacific Air Forces (PACAF) in the Philippines. Air Forces in Thailand were administratively under the 13th Air Force in the Philippines with the exception of SAC Forces at U Tapao Royal Thai Navy Base (RTNB) which was under CINCSAC, Omaha, Nebraska. These assets would come under Burns as C7AF when committed to combat. The role of the JCS was by law only advisory, but their need for information and access to it quickly brought them into the decision-making process (Guilmartin, 1990, pg. 16). Admiral Gayler was in Washington at the time of the incident and ended up working with the JCS throughout the crisis. Through their control of the NMCC, the JCS were to act as an intermediate level of command. General Burns was given complete OPCON over USAF forces, naval forces and Marines. In all cases, he was going to act through an airborne command post orbiting off the coast of Thailand. (Guilmartin, 1990, pg. 16)

General Burns was directly responsible for combat operations in the Gulf of Siam. He formed a tactical planning and execution cadre whose nucleus was comprised of senior commanders and staff officers from 13AF, USSAG, and 7AF. It included fighter pilots, helicopter pilots and navigation experts. In addition, two of the pilots had carrier experience. The arrival of Colonel Johnson, USMC, rounded out this team. (Guilmartin, 1990, pg. 29)

5. Command, Control and Communications

Intelligence estimates of Khmer Rouge strength on Koh Tang available to mission planners was varied in detail. Commander, Intelligence Pacific (IPAC), estimated a strength of 90 - 100 troops plus a heavy weapons squad armed with mortars and heavy machine guns. The DIA estimated a force of 150 - 200 with about the same amount of heavy weapons. After the assault, the Marine assault force commander estimated that his force had been opposed by about 150 soldiers well equipped with heavy weapons. Unfortunately, neither the IPAC nor DIA estimates were briefed to the assault force. This information, as it turned out, may have been an important consideration prior to placing the marines on Koh Tang. (Guilmartin, 1990, pg. 27)

Two days following the taking of the S.S. Mayaguez, U.S. planners were fairly certain that the crew was no longer aboard the vessel. It became evident that most, if not all, of the crew had been removed from the ship and might still be on Koh Tang or taken to the mainland. Navy and Air Force pilots had located the ship anchored a mile off the northeast tip of Koh Tang and had observed the offloading and transfer of 30 - 40 personnel -- presumably the crew -- to the island. Aircraft involved in these overflights of Koh Tang had been fired at by patrol boats and anti-aircraft positions on the island. (Guilmartin, 1990, pg. 23)

By this time, USSAG/7AF headquarters at Nakhon Phanom, CINCPAC headquarters in Hawaii and PACAF headquarters in the Philippines were linked to one another. They were also linked to forces under their command and to the NMCC and White House through a sophisticated real time voice communications

net. On a selective basis, this net could also link up with tactical aircraft on the scene. (Guilmartin, 1990, pg. 24)

By agreement, U.S. Navy patrol aircraft assumed responsibility for tracking ship traffic while USAF aircraft assumed responsibility for cordoning off the S.S. Mayaguez and Koh Tang. To prevent transfer of the crew to the mainland, U.S. aircraft were authorized to fire warning shots ahead of the boats departing the island. When Air Force fighter-bombers observed a fishing boat, escorted by gunboats, make a run from Koh Tang toward the mainland, bombs were dropped ahead of the boat. Its escorting patrol boats were sunk, and it was doused with riot-control gas. Officials back in Washington were kept abreast of the developments. At one point, a fighter pilot recommended shooting off the boat's rudder with cannon fire, but on a low pass, reported seeing Caucasians on deck. President Ford was in direct contact with aircrews on the scene, and when he heard this news, he ordered the fighters to allow the fishing boat to proceed. It was observed entering Kompong Som harbor and mooring later that morning. It was in this environment that USSAG/7AF, in constant consultation with higher authorities in Washington, CINCPAC headquarters in Hawaii, and PACAF headquarters in the Philippines, settled on the final plan to simultaneously assault the S.S. Mayaguez and Koh Tang. (Guilmartin, 1990, pp. 24-25)

6. The Rescue and the Assault

At 0230 on 15 May, combat Marines of the assault force assembled near the helicopters at U Tapao. A C-130 aircraft orbiting 90 miles away was responsible for overall command of the operation. The commander of the ground assault force,

Colonel Johnson, and his staff elected to remain in Thailand until after the first wave hit Koh Tang and then go in with the reinforcements. Direct operational command of the assault passed then to the airborne mission commander orbiting in his aircraft. These command and control relationships were not the normal operational relationships for Marine operations. Instead of a clear line of command running from the field units to a combat staff deployed on the island and then to a nearby command post aboard ship, these critical command links ran from the commander on the ground to the mission commander in the air ninety miles away. Should anything have disrupted these communications, the Marines would have been isolated on the island. Two hours later, helicopters carrying the assault forces to U.S.S. Holt and to Koh Tang took off from U Tapao enroute to their respective missions. (Gabriel, 1985, pg. 71)

The assault on the S.S. Mayaguez went as planned. The three helicopters rendezvoused with U.S.S. Holt on schedule and transferred the troops aboard. Once the assault force was aboard, the U.S.S. Holt pulled alongside the Mayaguez and prepared to board and seize. At the same time, A-7s appeared and dropped the incapacitating gas. As the Marines rushed the ship, they realized that the Cambodians had abandoned it. Navy explosives experts searched the ship for demolition charges but found none. With the vessel secured, the team of civilian seamen from MSC made preparations to weigh anchor and get S.S. Mayaguez underway. In one hour, the assault forces had achieved their goal and ran an American flag up the ship's mast. (Gabriel, 1985, pg. 71)

Just prior to the assault, the Cambodians on the mainland freed the crew and sent them toward their ship aboard a fishing boat flying a white flag. This situation had gone unnoticed by many combat and reconnaissance aircraft in the area. The fishing boat cautiously approached U.S.S. Wilson and, when the Navy ship recognized the passengers aboard, flashed Washington with the news of the safe return of the crew. (Guilmartin, 1985, pg. 72)

The crew's release had been secured by diplomatic means rather than by military action. At this point, however, the military operation was gaining momentum, and despite the safe return of the crew members by the Cambodians, the assault on Koh Tang continued. No action was taken to call off the planned air raids against the mainland airport and oil storage facilities even though they served no useful military purpose. Furthermore, the helicopters on their way to land Marines on Koh Tang were not called back. In fact, as the plan proceeded and as it was apparent that things were going badly for the Marines, a decision was made by USSAG/7AF to reinforce the Marines who had landed in the wrong place. (Guilmartin, 1985, pg. 72)

The Marines were specifically put ashore at Koh Tang because it was believed that the S.S. Mayaguez crew was still being held there despite evidence to the contrary. Reconnaissance aircraft had earlier witnessed the off-loading of the crew in Sihanoukville. The crew was actually being held on the small island of Koh Rong within the harbor. Information that, except for the S.S. Mayaguez's presence off-shore, no American personnel were held at Koh Tang was known by relevant commanders and the president. The assault on Koh Tang was allowed to proceed

anyway with the intention of teaching the Cambodians a lesson. (Gabriel, 1985, pg. 73)

Tactical maps of Koh Tang island did not exist. A dense jungle with a thick canopy foliage impaired intelligence collection attempts against the island's defenses. Relying on fishermen, sea captains, and Cambodians and Thais living in U Tapao to provide descriptions of the island, intelligence planners determined that there were no military fortifications on the island. They expected to find no more than about 20 elderly people -- despite the knowledge that enemy forces had to be present if the crew of S.S. Mayaguez was in fact being held there. (Gabriel, 1985, pg. 74)

The Marine assault force was totally unprepared for the size and disposition of the enemy force that met them. The Marines had little or no knowledge of the island's terrain, and their landing zone faced a thick jungle from which the enemy's defensive positions had been established. Furthermore, with their backs to the sea, the Marines were unable to extract themselves once committed. (Gabriel, 1985, pg. 75)

The balance of forces favored the Cambodians by a ratio of almost three to two. The Marines faced a numerically superior enemy who could fire at them from two directions. Because there were no hostile forces expected on the island based on locally obtained intelligence information (recall that the DIA and IPAC reports had not been made available to the assault force), no suppressive air or naval gunfire was used. The thick jungle canopy prevented observation of enemy positions anyway. (Gabriel, 1985, pg. 76)

In the first fifteen minutes of the Marine landing, the mission had become a disaster. Helicopters and troops came under intense fire from concealed enemy positions. The Marines lost almost 40 percent of their combat force in their initial assault against Koh Tang. Almost all of the helicopters in the first assault wave suffered severe damage or were shot down. The loss of these helicopters (seven total) meant that the marines no longer had sufficient airlift for reinforcement from U Tapao. Even so, reinforcements would not be able to help trapped comrades for nearly five hours. The Marines who were under heavy attack by the Cambodians could do nothing but construct a perimeter defense and wait. (Gabriel, 1985, pg. 77)

In addition, the KC-10 failed to relay messages from the Marines at Koh Tang to headquarters at U Tapao because the communications circuits on the airborne KC-10 were saturated. The KC-10 had apparently become preoccupied with helicopter rescue operations of the Marines on the ground who were coming under heavy, intense fire. The KC-10 controllers inadvertently directed attention away from reinforcement and support of the Marines. (Gabriel, 1985, pg. 67)

Of the 127 men in the second assault team, only 100 were actually placed on the island. With these men, the combined force numbered 225, separated in three elements and pinned down by the enemy. Although the original mission was to secure the island and hold it for 48 hours, it soon became clear that the Marines had no chance of securing the island and rescuing anyone (Gabriel, 1985, pg. 78). To the ground commanders, it was clear that they had to break out and link up if they were to consolidate their defenses and survive. Failing to do so would make it impossible to extract the force when the time came. Near the end of the second

day, western area forces were able to link up but remained cut-off from eastern area troops by an alley of hostile enemy fire. (Gabriel, 1985, pg. 79)

The Marines had lost their tactical air-control radios in the surf when their helicopter was shot down. As a consequence, they could not call in air strikes. Some innovative methods were used by the Marines to direct the efforts of strike aircraft, but the distance between the Marines and suspected enemy strong positions was too close, thus making the risk of getting hit by friendly fire too great. Air support was used effectively, but naval gunfire was used only during the evacuation because by then the distance between enemy and Marine positions had increased.

Midmorning on 15 May, the President gave the order to cease all military activity and withdraw the Marine forces from Koh Tang. The evacuation efforts lasted for nearly 24 hours. Much of the attempt was conducted in total darkness. Helicopters became easy targets for the enemy, but Marine OV-10 tactical air-control aircraft were used to spot muzzle flashes in the dark and direct AC-130 gunships to suppress enemy fire. Finally, at approximately 0810, helicopters went in for the last time to pick up two remaining Marines who had stayed to ensure no one was left behind, and the battle for Koh Tang was over.

The decision to invade Koh Tang cost the lives of 18 men with 50 more wounded. Twelve heavy-lift helicopters had been destroyed or damaged. Normally, when a force suffers 30 percent casualties, it is considered no-longer combat effective. At Koh Tang, 26.5 percent of the 250 man force was rendered ineffective. It is considered among analysts in post-action reports that the Marines landed in a

non combat-effective status failing to accomplish the mission it had been given.

(Gabriel, 1985, pg. 82)

B. QUESTIONS FOR THE STUDENTS

1. Explain how communications helped or hindered the operational chain of command. What impact does having the capability for the president to communicate directly with troops in the field have on command structure?

2. Explain how intelligence distribution affects the planning phase of an operation. Does a cross flow of intelligence information between services and agencies help reduce interoperability problems? If so, how?

3. Describe how centralization and skipping echelons (by-passing the normal chain of command) can affect operational levels in the chain.

4. How does information overload on command centers (associated with advanced C3 technology) impact a rapid paced combat environment?

X. SUMMARY AND CONCLUSIONS

This thesis provides material on a number of relevant C3 issues facing today's military establishment. An introduction to such topics as interoperability, unity of command, echelon skipping in command structures, the joint arena, the role of communications and the impact of standardization are considered. This study puts these issues in the context of a series of case studies which examine the effects of practices and patterns of C3 on past military contingency operations. Together, the four quick reaction contingency operations examined took place over a span of almost twelve years, with some actions separated from another by approximately two years -- yet, the C3 lessons learned from each effort remain remarkably the same. This situation certainly raises doubt as to whether these lessons derived from the earliest actions were effectively learned and incorporated into the planning and execution of subsequent operations. In the author's opinion, the consistency over time of the lessons learned from these operations seems to indicate a problem in the military's ability to transfer experience and effectively institutionalize corrective actions. Although a detailed analysis of the reasons why the military has been unsuccessful at transferring lessons to future operations is beyond the scope of this thesis, some general observations are considered relevant. The nature of the lessons learned from each of the cases presented seems to fall into two broad, yet basic categories: (1) planning, and (2) equipment inadequacies.

114

A great deal of progress has been made with respect to improving planning efforts. The CAS and JOPS are both specifically designed to structure and formalize the planning process. It is important to military planners that all aspects of a military operation are considered and assessed. Too often, detailed planning for contingency operations is performed on an ad hoc basis at base and unit levels. Here, planning is done by qualified, operationally experienced personnel, but not by planning-experienced personnel. Today's joint professional military education programs are making inroads at providing a structured process for developing a cadre of professional military planners. In the past, individuals who are richly experienced in operational matters were forced to learn to plan contingency operations as they were doing it on the job. The result was a wide range of planning quality. Additionally, the ad hoc nature and the generally compressed time frames of contingency planning seem to further degrade the quality of planning.

The equipment problem can be categorized as a lack of interoperability and a lack of adequacy or availability. Lack of secure voice communications and inadequate satellite channel capacity have been long standing problems. Irrespective of the development and procurement process, in the author's opinion, there seems to be a lack of commitment or willingness to redirect or assign resources necessary to fix equipment deficiencies in the C3 arena. The traditional approach seems to be to develop quick fixes to work around the problem. This method is both clumsy and inefficient, and provides only short term solutions. Joint contingency responses and operations require standard configurations and compatible, interoperable equipment as a permanent feature of the four services.

One of the principal conclusions reached in this thesis is that there are inherent institutional and organizational constraints on the use of advanced C3 technology for the conduct of contingency or crisis action operations. The technological capabilities for remote control and instant communications with operational combat units, do not, in and by themselves, result in any added flexibility or any greater organizational coherence, than an effective C3 system is supposed to provide. On the contrary, the evidence suggests that when advanced C3 technology is applied without organizational adjustments and changes in operational procedures, it contributes to failures of control and communications. In the author's opinion, this area of C3 is not thoroughly or systematically treated in the literature on C3 and hence in the course work at the Naval Postgraduate School. It is an area which requires additional systematic research.

LIST OF REFERENCES

Air War College Research Report, Au-AWC-88-043, "Command and Control and Communications Lessons Learned: Iranian Rescue, Falklands Conflict, Grenada Invasion, Libya Raid", Anno, S.E., COL, USAF, and Einspahr, W.E., LTCOL, USAF, 1988.

Beal, R.S., "Decision Making, Crisis Management, Information and Technology", *Seminar on Command, Control, Communications and Intelligence*, Center for Information Policy Research, Harvard University, Spring 1984.

Boyes, J.L., and Andriole, S. J., *Principles of Command and Control*, AFCEA International Press, 1987.

Cardwell, T.A., III, *Command Structure for Theater Warfare The Quest for Unity of Command*, U.S. Government Printing Office, 1984.

Chief of Naval Operations, SER 953E/7S350989, "Lessons Learned from Operations in the Vicinity of Libya (U)", SECRET, 1987.

Defense Technical Information Center, NDU-NWC-84-74, *Joint or Not Too Joint: An Analysis of U.S. Joint Military Operations*, Wilson, R.J., COL, USMC, UNCLASSIFIED/LIMITED, March 1984.

Dooley, A.R., and Skinner, W., *Academy of Management Review*, "Casing Casemethod Methods", Harvard Business School, April 1977.

Gabriel, R.A., *Military Incompetence Why the American Military Doesn't Win*, Hill and Wang, 1985.

Gissin, R., *Command, Control, and Communications Technology: Changing Patterns of Leadership and Combat Organizations*, University Microfilms International, 1979.

Guilmartin, J.F., Jr., "The Seventy Eight Hour War: The *SS Mayaguez* Incident, 12-15 May 1975. A Case Study in the Employment and Control of United States Armed Forces", Ohio State University, 1990.

Hilton, R., "Roies of the Joint Chiefs of Staff in Crisis Management", *Seminar on Command, Control, Communications and Intelligence*, Center for Information Policy Research, Harvard University, Spring 1985.

Lane, J.J., LTCOL, USAF, *Command and Control and Communications Structures in Southeast Asia*, Airpower Research Institute, 1981.

Metcalf, J., VADM, USN, "Decision Making and the Grenada Rescue Operation." In *Ambiguity and Command*, pp. 277-297. Edited by James G. March and Roger Weissinger-Baylon. Marshfield, M.A.: Pitman Publishing Inc., 1986.

National Defense University Armed Forces Staff College, "Pub 1 - Joint Staff Officers Guide", 1984.

Naval Research Advisory Committee, *NRAC 85-7, Joint C3 Interoperability (U)*, 1987.

Ryan, P.B., *The Iran Rescue Mission Why it Failed*, Naval Instutute Press, 1985.

Stilwell, R.G., "Policy and National Command", *Seminar on Command, Control, Communications and Intelligence*, Center for Information Policy Research, Harvard University, Spring 1982.

Stilwell, R.G., "Structure and Mechanisms for Command and Control", *Seminar on Command, Control, Communications and Intelligence*, Center for Information Policy Research, Harvard University, Spring 1985.

Stoner, J.A.F., and Freeman, R.E., *Management*, 4th ed., Prentice Hall, 1989.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center   2
   Cameron Station
   Alexandria, VA   22304-6145

2. Library, Code 0142   2
   Naval Postgraduate School
   Monterey, CA   93943-5000

3. Director for Command, Control and Communications   1
      Systems, Joint Staff
   Washington, DC   93943-5000

4. C3 Academic Group, Code CC   1
   Naval Postgraduate School
   Monterey, CA   93943-5000

5. Plans Division   1
   Naval Space Command
   Dahlgren, VA   22448-5170
   Attn: CAPT. David J. Barile, USMC

6. Commanding Officer   3
   U.S.S. Crommelin (FFG-37)
   F.P.O San Francisco, CA   96662-1492
   Attn: LCDR Scott A. Berg, USN